# CHAPTER 3: AFFECTED ENVIRONMENT

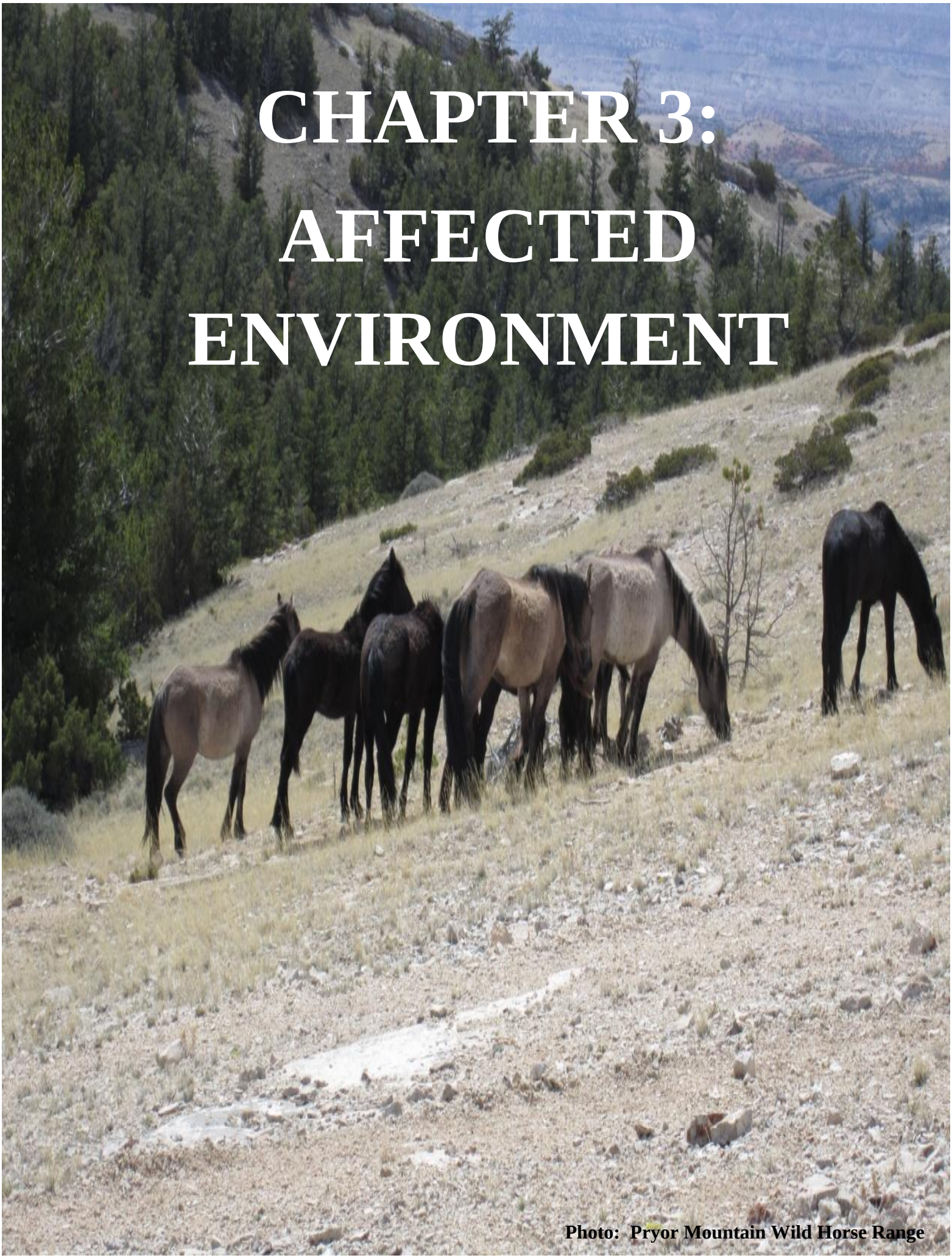

Photo: Pryor Mountain Wild Horse Range

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# 3 Affected Environment

## 3.1 Introduction

Chapter 3 provides information on the current condition of resources, resource uses, and programs in the Billings Field Office (BiFO) decision area that could be affected by the revised RMP alternatives described in Chapter 2. This chapter is organized into Resources, Resource Uses, Special Area Designations, and Social and Economic. Each of these sections is further divided into resources or program areas. This is the organization prescribed in the BLM guidance (USDI-BLM 2005). Existing conditions described herein are used as the baseline against which impacts of the different alternatives are analyzed and compared in Chapter 4.

Management of resources and resource uses on public lands administered by the BLM is directed by a variety of laws, regulations, policies, and other requirements as summarized in Chapter 1. The BiFO operates under these requirements and guidance and also considers Best Management Practices (BMPs) in the management of resources and resource uses in the decision area.

Throughout this document, the term "planning area" refers to all lands in the BiFO administrative boundary, regardless of ownership or jurisdiction. The term "decision area" refers to lands in the planning area where the BLM has authority to make land use and management decisions; this includes split estate lands where the federal government has retained subsurface minerals.

## 3.2 Physical, Biological, and Heritage Resources

Section 3.2 provides information on the current condition of resources that could be affected by the revised RMP alternatives described in Chapter 2. Resources discussed in this RMP include:

- Air
- Climate change
- Geology
- Soil
- Water
- Vegetation
    - Forests and woodlands
    - Rangelands
    - Riparian and wetlands
    - Invasive species and noxious weeds
    - Special status plants
- Wildlife habitat and special status species
- Fisheries habitat and special status species

- Wild horses and burros
- Cultural/heritage resources
- Paleontological resources
- Visual resources
- Fire ecology and management
- Wilderness characteristics
- Cave and karst resources

## 3.2.1 Air

Regional air resources are influenced by the interaction of several factors, including weather, climate, the magnitude and spatial distribution of local and regional air pollutant sources, and the chemical properties of emitted air pollutants. Air resources include air quality and air quality related values (AQRVs), which include visibility and acid deposition to soils and lakes.

### 3.2.1.1 Regional Winds

Wind is a critical component of ambient air quality because it disperses pollutants and transports them away from the point of origin. The prevailing wind direction for Billings, Montana is out of the southwest, with the exception of May to July, when wind typically comes from the north (see Table 3-1). Average wind speeds range from 9 to 13 miles per hour (mph), which is generally considered a "gentle breeze" where "leaves and small twigs can be in constant motion and where the wind can extend a light flag" (Lutgens and Tarbuck 1989). Winter conditions may produce moderate winds with individual days generating strong winds.

**Table 3-1 Prevailing Wind Directions and Average Speeds (mph) for Billings**

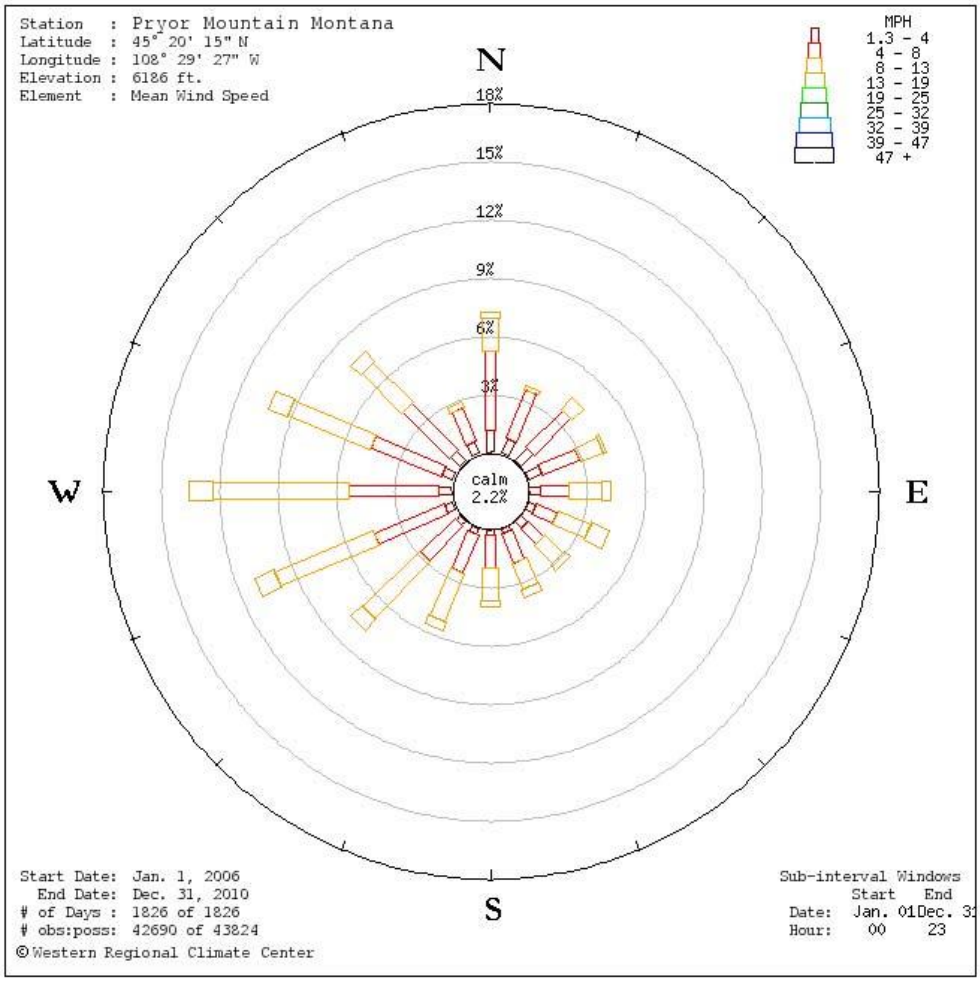
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SW | SW | SW | SW | N | N | N | SW | SW | SW | SW | SW | SW |
| 13 | 12 | 11 | 11 | 10 | 10 | 09 | 09 | 10 | 10 | 12 | 13 | 11 |

**Note:**

Source: http://www.wrcc.dri.edu/htmlfiles/westwinddir.html (data from 1992-2002), accessed August 23, 2011.
http://www.wrcc.dri.edu/htmlfiles/westwind.final.html (data from 1996-2006), accessed August 23, 2011.

Wind varies considerably from one location to another. A wind rose for the Pryor Mountain Remote Automated Weather Station (RAWS) in the southern portion of the BiFO indicates more westerly winds at this location. The 16 arms in Figure 3-1indicate the frequency of wind blowing from the indicated direction. Longer arms indicate that the wind more frequently originates from the illustrated direction. Colored bands within each arm indicate the proportion of time that the wind blows with a given speed.

**Figure 3-1 Wind Rose for Pryor Mountain, Montana (data from 2006-2010)**




**Note:**
Source: http://www.raws.dri.edu

### 3.2.1.2 Criteria Air Pollutants

Criteria air pollutants are substances for which the US Environmental Protection Agency (USEPA) established national health-based concentration standards under the National Ambient Air Quality Standards (NAAQS) program. Criteria air pollutants include carbon monoxide (CO), lead (Pb), nitrogen dioxide ($NO_2$), ozone ($O_3$), particulate matter with a diameter greater than or equal to 10 micrometers ($PM_{10}$), particulate matter with a diameter greater than or equal to 2.5 micrometers ($PM_{2.5}$), and sulfur dioxide ($SO_2$). Criteria air pollutant concentrations are compared to NAAQS (EPA 2010c) and Montana Ambient Air Quality Standards (MAAQS). The NAAQS include both primary and secondary standards, as shown in Table 3-2. Primary standards protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards protect public welfare by preventing damage to buildings, infrastructure, and vegetation.

## Table 3-2 Federal and State Ambient Air Quality Standards

| Pollutant | Federal NAAQS[1] | | | State MAAQS[2] |
|---|---|---|---|---|
| | Averaging Time | Level | Standard Type | Level |
| Carbon Monoxide (CO) | 8-hour | 9 ppm[3] | Primary | 9 ppm[12] |
| | 1-hour | 35 ppm[3] | Primary | 23 ppm[12] |
| Fluoride in Forage | Monthly | N/A | N/A | 50 µg/g |
| | Grazing Season | N/A | N/A | 35 µg/g |
| Lead (Pb) | 3-month (rolling) | 0.15 µg/m$^3$ [5] | Primary, Secondary | N/A |
| | 90-day | N/A | N/A | 1.5 µg/g[5] |
| Nitrogen Dioxide ($NO_2$) | Annual | 0.053 ppm[5] | Primary, Secondary | 0.05 ppm[13] |
| | 1-hour | 0.100 ppm[10] | Primary | 0.30 ppm[12] |
| Fine Particulate Matter ($PM_{2.5}$) | Annual | 15.0 µg/m$^3$ [11] | Primary, Secondary | N/A |
| | 24 hour | 35 µg/m$^3$ [7] | Primary, Secondary | N/A |
| Particulate Matter ($PM_{10}$) | Annual | N/A | N/A | 50 µg/m$^3$ [4] |
| | 24-hour | 150 µg/m$^3$ [8] | Primary, Secondary | 150 µg/m$^3$ |
| Settleable Particulate | 30-day | N/A | N/A | 10 g/m$^2$ |
| Ozone ($O_3$) | 8-hour | 0.075 ppm[6] | Primary, Secondary | 0.10 ppm[12] |
| Sulfur Dioxide ($SO_2$) | Annual | 0.030 ppm[5] | Primary | 0.02 ppm[13] |
| | 24-hour | 0.14 ppm[3] | Primary | 0.10 ppm[12] |
| | 3-hour | 0.5 ppm[3] | Secondary | N/A |
| | 1-hour | 0.075 ppm[9] | Primary | 0.50 ppm[14] |
| Visibility | Annual | N/A | N/A | 3 x 10$^{-5}$/m[15] |

Note:

1 NAAQS are codified in Title 40 of the Code of Federal Regulations (CFR), Part 50.
2 MAAQS are codified in Title 17, Chapter 8, Subchapter 2 of the Ambient Air Quality in the Administrative Rules of Montana (ARM).
3 Not to be exceeded more than once per calendar year.
4 Not to be exceeded more than once per year on average over 3 years.
5 Not to be exceeded.
6 Not to be exceeded based on the 3-year average of the fourth-highest daily maximum 8-hour concentrations per calendar year. On January 19, 2010, USEPA proposed to revise the 8-hour standard to a level between 0.060 to 0.070 ppm (EPA 2010q).
7 Not to be exceeded based on the 98$^{th}$ percentile of 24-hour concentrations at each population-oriented monitor.
8 Not to be exceeded more than once per calendar year, based on a 3-year average of maximum 24-hour values.
9 Not to be exceeded based on a 3-year average of the 99$^{th}$ percentile of the daily maximum concentrations.
10 Not to be exceeded based on a 3-year average of the 98$^{th}$ percentile of the daily maximum concentrations.
11 Not to be exceeded based on a 3-year average of the weighted annual mean from one or more community monitors.
12 Not to be exceeded more than once over any 12 consecutive months.
13 Arithmetic average not to be exceeded more than once over any 4 consecutive quarters.
14 Not to be exceeded more than 18 times in any 12 consecutive months.
15 This standard applies only in certain Class I areas (Table 3-6).

Areas that do not meet federal standards are designated as nonattainment areas (Map 4). Within the BiFO, the only nonattainment area is an $SO_2$ nonattainment area located in a small area in Laurel, Montana in Yellowstone County (USEPA 2010a, 2010b). The Sundance Lodge

Recreation area lies within the Laurel nonattainment area. Although not designated as an $SO_2$ nonattainment area, the Billings area has been identified as an area of concern for $SO_2$ by the Montana Department of Environmental Quality (MDEQ).

To the east of the BiFO, the community of Lame Deer within Rosebud County is the only nonattainment area near the planning area. Lame Deer is designated nonattainment due to high $PM_{10}$ concentrations.

### 3.2.1.3 Air Quality Monitoring

MDEQ performs regulatory monitoring of CO, $NO_2$, ozone, $SO_2$, $PM_{10}$, and $PM_{2.5}$ in order to determine compliance with NAAQS and MAAQS. Air pollutant concentration monitoring networks in Montana include the State and Local Air Monitoring Stations (SLAMS), Tribal monitoring networks, and the Clean Air Status and Trends Network (CASTNet). SLAMS are usually located in urban areas and measure criteria pollutants. The MDEQ) operates the SLAMS network to determine compliance with regulatory concentration standards. CASTNet stations are located in remote areas and measure concentrations of compounds that are of interest to ecosystem health. Air pollutant concentrations are usually reported on a volume basis as parts per million (ppm) or parts per billion (ppb) for gaseous substances and on a mass basis as micrograms per cubic meter ($\mu g/m^3$) for solid substances such as $PM_{10}$ and $PM_{2.5}$.

Monitors that provide information on AQRVs include the National Acid Deposition Program (NADP) network and the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. A list of monitoring stations in or near the planning area is provided in Table 3-3.

**Table 3-3 Air Quality Monitoring Stations in the BiFO or Vicinity**

| Monitoring System | Station Identifier | Pollutant or AQRV | Location | Latitude | Longitude |
|---|---|---|---|---|---|
| SLAMS | 30-111-0066 | $SO_2$ | Billings – Coburn Road | 45.7883 | -108.4595 |
| | 30-111-0085 | CO, $PM_{2.5}$ | Billings – St. Luke's | 45.7822 | -108.5115 |
| | 30-087-0001 | NO, $NO_2$, $NO_x$, $O_3$, $PM_{10}$, $PM_{2.5}$ | Birney – Tongue River | 45.3662 | -106.4894 |
| | 30-031-0019 | $PM_{2.5}$ | Bozeman – High School | 45.7262 | -111.0681 |
| CASTNET | YEL408 | $O_3$, $SO_2$, Deposition | Yellowstone National Park (Wyoming) | 44.5597 | -110.4006 |
| NADP | MT00 | Wet Deposition | Little Bighorn Battlefield National Monument | 45.5686 | -107.4375 |
| | WY08 | Wet Deposition | Yellowstone National Park – Tower Falls (Wyoming) | 44.9166 | -110.4203 |
| IMPROVE | NOCH1 | Visibility | Northern Cheyenne | 45.6493 | -106.557 |
| | ULBE1 | Visibility | UL Bend | 47.5823 | -108.72 |
| | NOAB1 | Visibility | North Absaroka (Wyoming) | 44.7448 | -109.3816 |

**Table 3-3 Air Quality Monitoring Stations in the BiFO or Vicinity**

| Monitoring System | Station Identifier | Pollutant or AQRV | Location | Latitude | Longitude |
|---|---|---|---|---|---|
| | YELL2 | Visibility | Yellowstone NP (Wyoming) | 44.5653 | -110.4002 |
| | CLPE1 | Visibility | Cloud Peak (Wyoming) | 44.3335 | -106.9565 |

The sources and effects of each criteria pollutant are explained below. Recent ambient air quality monitoring data are shown as the percentage of the monitored concentration compared to the NAAQS in Figure 3-2– Ambient Air Quality Concentrations in the BiFO Planning Area. Values shown in Figure 3-2 are based on the format of the NAAQS. For example, when a NAAQS allows one exceedances of a standard per year, the second highest monitored value is reported for comparison to the NAAQS. Due to the geographic distribution of Montana monitors, some of the monitoring sites considered to be representative of the planning area are located outside the planning area.

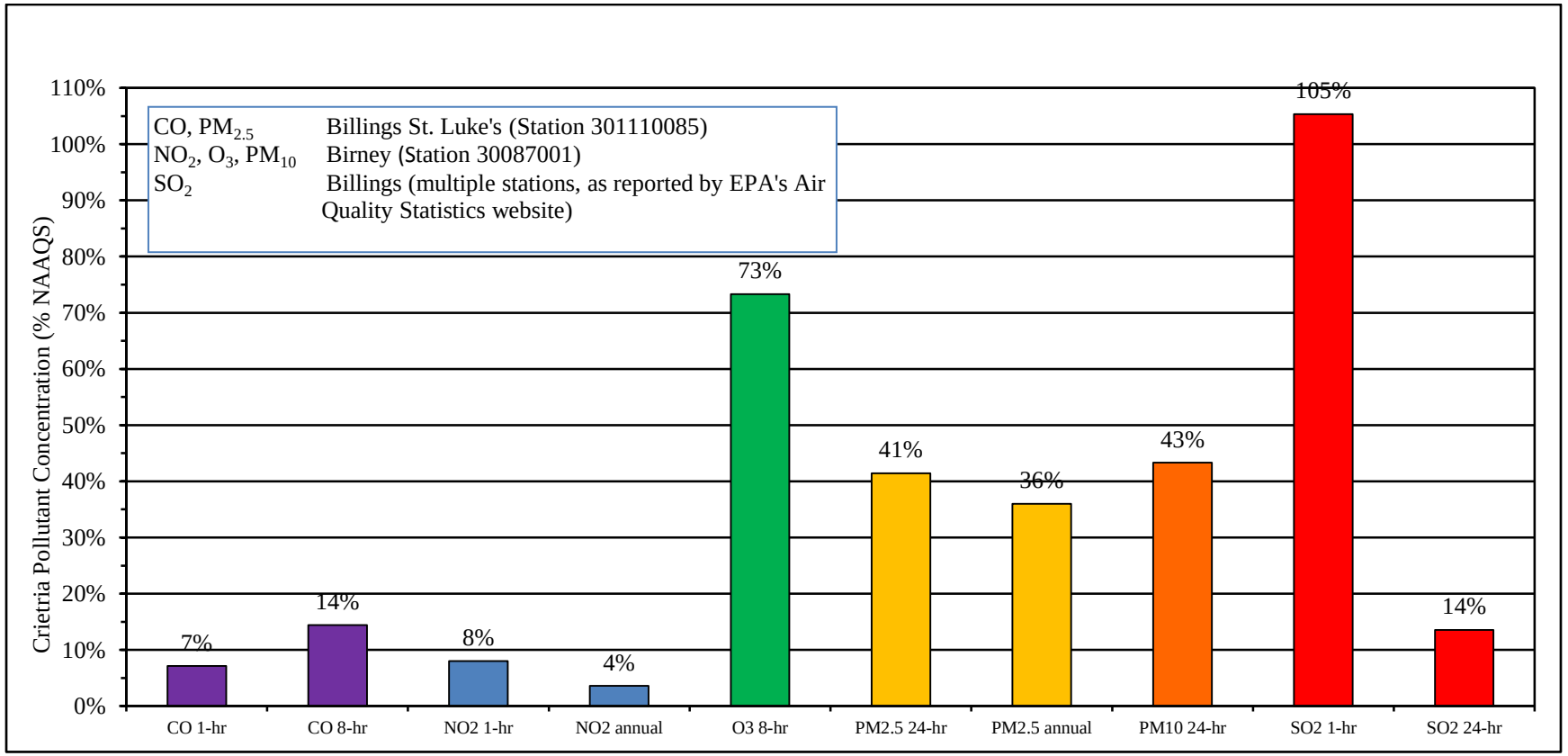
### 3.2.1.4 Carbon Monoxide

CO can have significant effects on human health because it combines readily with hemoglobin and consequently reduces the amount of oxygen transported in the bloodstream. Effects on humans from exposure to high CO concentrations can include slight headaches, nausea, or death.

Motor vehicles and other internal combustion engines are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when periods of light winds combine with ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. CO is also created during refuse, agricultural, and wood-stove burning and through some industrial processes.

In 2011, the second highest 1-hour CO concentration in Billings was 2.5 ppm, approximately 7 percent of the corresponding primary NAAQS. This concentration was 11 percent of the more stringent 1-hour CO MAAQS. The second highest 8-hour CO concentration was 1.3 ppm during the same year and was approximately 14 percent of the corresponding primary NAAQS and MAAQS.

**Figure 3-2 Ambient Air Quality Concentrations in the BiFO Planning Area (2009-2011)**




**Note:**

CO Based on second maximum values (2011)

$NO_2$ 1-hour: 30year average of 8th highest daily maximum (2010-2011, only 2 years available)
Annual: arithmetic mean (2011)

$O_3$ 3-year average of 4th highest daily maximum 8-hour average (2010-2011, 2 years)

$PM_{2.5}$ 24-hour: 3-year average of 98th percentile (2009-2011)
Annual: 3-year average weighted mean (2009-2011)

$PM_{10}$ 24-hour: 3 year average of second maximum (2010-2011, 2 years available)

$SO_2$ 1-hour: 3-year average of the 99th percentile (2009-2011)
3-hour and 24-hour: Second maximum (2011)
Annual: arithmetic mean

### 3.2.1.5 Lead

The primary historical sources of lead emissions have been certain types of industrial sources and lead in gasoline and diesel fuel. However, since lead in fuels has decreased substantially, processing of metals containing trace amounts of lead is now the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources include waste incinerators, utilities, and lead-acid battery manufacturing plants. The effects of lead exposure include brain and other nervous system damage; children exposed to lead are particularly at risk. Due to the lack of large lead emission sources, lead levels in the planning area are expected to be well below the NAAQS and MAAQS. No data are available to determine the trend in lead concentrations. However, decreasing lead levels in gasoline and diesel fuel indicate a likely decrease in lead levels within the planning area.

### 3.2.1.6 Nitrogen Dioxide

Nitrogen oxides ($NO_x$), including nitric oxide (NO) and $NO_2$, are formed when naturally occurring atmospheric nitrogen and oxygen are combusted with fuel in automobiles, power plants, industrial processes, and home and office heating. At high exposures, $NO_2$ causes respiratory system damage of various types, including bronchial damage. Its effects are exhibited by increased susceptibility to respiratory infection and changes in lung function. Within the atmosphere, $NO_2$ contributes to visibility impacts and may be visible as reddish-brown haze. $NO_2$ and other forms of $NO_x$ form nitric acid ($HNO_3$), a component of atmospheric deposition (e.g., acid rain.).

Hourly $NO_2$ concentrations at the Birney monitor in nearby Rosebud County were 8 percent of the NAAQS during 2009-2011, while annual concentrations were approximately 4 percent of the NAAQS and MAAQS.

### 3.2.1.7 Ozone

Ozone is not emitted directly into the atmosphere. Instead, it is formed by a photochemical reaction of precursor air pollutants, including volatile organic compounds (VOCs) and $NO_x$. These precursors are emitted by mobile sources, stationary combustion equipment, and other industrial sources. Ozone is produced year-round, but due to greater sunlight and air temperatures, urban ozone concentrations are generally greatest during the summer. Elevated ozone concentrations may also occur during winter in snow-covered rural areas.

Ozone is a severe eye, nose, and throat irritant. A potent oxidant, it increases susceptibility to respiratory infections and may cause substantial damage to vegetation (leaf discoloration and cell damage) and other materials (attacking synthetic rubber, textiles, paints, and other substances).

The 3-year average of the fourth highest 8-hour ozone concentration was 0.055 ppm at the Birney monitor, as estimated using data from 2010-2011. This is the only Montana ozone monitor with complete data for 2009. This measured concentration is 73 percent of the 8-hour 2008 primary and secondary NAAQS of 0.075 ppm.

### 3.2.1.8 Particulate Matter

Particulate matter includes $PM_{10}$ and $PM_{2.5}$. $PM_{10}$ impacts include health effects (because $PM_{10}$ is small enough to reach the lungs when inhaled), deposition on plants and surfaces (including soiling of snow which can contribute to climate change), localized reductions in visibility, and potential corrosion. $PM_{10}$ emissions are generated by a variety of sources including agricultural activities, industrial emissions, and road dust re-suspended by vehicle traffic. Within the planning area, primary sources of $PM_{10}$ include smoke from wildland fire, residential wood burning, street sand, physically disturbed soils, and dust from unpaved roads.

$PM_{2.5}$ poses greater health concerns than $PM_{10}$ because it can pass through the nose and throat and be trapped deep in the lungs. Fine particulate also contributes to reduced visibility in nationally important areas such as national parks. $PM_{2.5}$ emissions are primarily generated by internal combustion diesel engines, soils with high silt and clay content, and secondary aerosols formed by chemical reactions in the atmosphere.

The second highest 24-hour $PM_{10}$ concentration near the planning area was 65 µg/$m^3$ or 43 percent of the corresponding primary and secondary NAAQS at the Birney monitor (Rosebud County), as estimated using data from 2010-2011. The 3-year average 98th percentile 24-hour $PM_{2.5}$ concentration at the same location and year was 14.5 µg/$m^3$, which was 41 percent of the corresponding primary and secondary NAAQS. The 3-year average weighted mean $PM_{2.5}$ annual concentrations at the same location and year was 5.4 µg/$m^3$, or less than 36 percent of the corresponding primary and secondary NAAQS.

### 3.2.1.9 Sulfur Dioxide

$SO_2$ is a colorless gas with a pungent odor. Prolonged exposure to high levels of $SO_2$ can lead to respiratory failure, and $SO_2$ plays an important role in the aggravation of chronic respiratory illnesses such as asthma. $SO_2$ is emitted primarily from stationary sources that burn fossil fuels (i.e., coal and oil) containing trace amounts of elemental sulfur. Other human-caused sources of $SO_2$ include metal smelters and petroleum refineries. In the atmosphere, $SO_2$ converts to sulfuric acid, a component of atmospheric deposition (acid rain), and forms secondary aerosols, subsequently contributing to visibility impacts in nationally important areas.

The 3-year average 99$^{th}$ percentile 1-hour $SO_2$ concentration was 79 ppb in Billings (Yellowstone County) in 2009-2011. This concentration was 105 percent of the corresponding primary NAAQS, as calculated using data from EPA's Air Quality Statistics Report website (http://www.epa.gov/airquality/airdata/ad_rep_con.html). The 24-hour $SO_2$ values measured were 0.019 ppm (14 percent) of the NAAQS.

The 1-hour $SO_2$ NAAQS is a relatively new standard and EPA has not yet determined attainment/nonattainment area designations for this standard. On May 27, 2011, the MDEQ submitted a letter to EAP requesting that all counties in Montana should be designated attainment or unclassifiable based on data from 2008 through 2010 (MEQ 2011). The MDEQ letter reported that high monitored 1-hour $SO_2$ concentrations measured during 2010 were due to events that are not likely to be repeated in future years.

### 3.2.1.10 Air Quality Index

The USEPA air quality index (AQI) shows that the BiFO has good air quality that poses little health risk to the general public (Table 3-4). The AQI is an index used for reporting daily air quality indicating how clean or polluted an area's air is and whether associated health effects may be a concern. The AQI focuses on potential health effects a person may experience in a few hours or days after breathing ambient air.

The USEPA calculates the AQI for five criteria air pollutants: ground-level ozone, particulate matter, CO, $CO_2$, and $NO_2$. For each of these pollutants, USEPA established NAAQS to protect public health. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level the USEPA has set to protect public health. The following terms define AQI information:

- **Good –** The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- **Moderate –** The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups –** When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particulate pollution. The general public is not likely to be affected when the AQI is in this range.
- **Unhealthy –** Everyone may begin to experience health effects when AQI values are between 151 and 200, and members of sensitive groups may experience more serious health effects.

The AQI data summarized below show that air quality in Yellowstone County poses little risk to the general public. Over a recent 3-year period from 2009-2011, 83 percent of the days with data were rated "good" with 15 percent being "moderate." While health risk occurrences have been documented in Yellowstone County, occurrences of unhealthy days for sensitive populations are rare (approximately 1.5 percent); no days were unhealthy or very unhealthy. Pollutants responsible for the highest AQIs were $SO_2$ and $PM_{2.5}$.

**Table 3-4 Air Quality Index Report**

| EPA: AirData Air Quality Index Report – Field Office Summary | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Number of Days | | | | | | |
| County | Data Years | With Data | Rated Good | Rated Moderate | Rated Unhealthy for Sensitive Groups | Rated Unhealthy | Percentage of Days Rated Good | Average. 90th Percentile AQI |
| Yellowstone | 1999-2008 | 1,095 | 1,904 | 176 | 15 | 0 | 83% | 61 |
| **Field Office Percentage** | | | **83%** | **16%** | **1.5%** | **0%** | | |
| | | | | | | | | |

**Note:**
Source: USEPA, Air Quality Index Report website
(http://www.epa.gov/airquality/airdata/ad_rep_aqi.html) accessed December 21, 2012.

### 3.2.1.11 VOCs

VOCs include a variety of chemicals, some of which have adverse health effects. Concentrations of many VOCs are consistently higher indoors than outdoors. VOCs are emitted from equipment such as organic liquid storage tanks, leaking equipment, and from engines and other combustion equipment. In addition, thousands of products emit VOCs, including paints, cleaning supplies, pesticides, building materials, office equipment, glues, and permanent markers (EPA 2010d). VOCs are not subject to a NAAQS. However, since they react with $NO_x$ to form ground-level ozone, VOCs are a precursor to ozone and VOC emissions are regulated by USEPA.

### 3.2.1.12 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are pollutants that are known or suspected to cause cancer or other serious health problems, which include chronic respiratory disease, reproductive disorders, or birth defects. Of the 187 regulated HAPs, several are commonly emitted from planning area engines and other sources. Engine-emitted HAPs include formaldehyde, benzene, toluene, ethyl benzene, xylenes, and hexane (i.e., n-hexane). Potential concentrations of HAPs are compared to health-based thresholds to estimate the risk of health effects.

### 3.2.1.13 Other Pollutants

Other air pollutants of interest include nitrogen and sulfur compounds because they contribute to acid deposition and regional haze. Nitrogen compounds include particulate nitrate ($NO_3^-$), nitric acid, and ammonium ($NH_4^+$), while sulfur compounds include particulate sulfate ($SO_4^{-2}$) and $SO_2$. Concentrations of $HNO_3$, $SO_2$, $NH_4^+$, $NO_3^-$, and $SO_4^{-2}$ are low in Montana relative to concentrations across the United States (NADP 2010c, 2010d, 2010e).

### 3.2.1.14 Criteria Pollutant Emissions

Current air quality reflects the impacts of emissions from existing sources of air pollution. Table 3-5 provides an estimate of recent emissions within the BiFO based on a compilation of available emission inventory sources. Emissions of HAPs and greenhouse gases (GHGs) are not included in Table 3-5 because these emissions have not been reported to the MDEQ and the information is generally not available. Due to recent implementation of a new federal air quality rule, many facilities within the MCFO will begin reporting GHG emissions to USEPA.

**Table 3-5 BiFO Criteria Pollutant Emissions by County**

| County | Emissions (tons/year) | | | | | |
|---|---|---|---|---|---|---|
| | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | VOC | $SO_2$ |
| Big Horn | 8,439 | 4,241 | 5,632 | 706 | 1,022 | 478 |
| Carbon | 3,310 | 646 | 4,476 | 519 | 459 | 25 |
| Golden Valley | 762 | 166 | 499 | 63 | 219 | 4 |
| Musselshell | 1,915 | 252 | 2,232 | 254 | 270 | 22 |
| Stillwater | 3,530 | 1,104 | 3,617 | 455 | 442 | 34 |
| Sweet Grass | 2,711 | 854 | 1,716 | 218 | 399 | 11 |
| Wheatland | 1,004 | 228 | 1,209 | 143 | 179 | 5 |
| Yellowstone | 33,260 | 8,577 | 13,311 | 2,174 | 5,960 | 7,568 |
| **Total** | **54,931** | **16,068** | **32,692** | **4,533** | **8,949** | **8,147** |

**Note:**
Source: USEPA 2011e

### 3.2.1.15 Emission Sources

Emission sources include rural and urban sources and the largest sources vary by pollutant. The largest three source categories for each criteria air pollutant are provided in Table 3-6. When emissions from all counties within the BiFO are aggregated, mobile on-road vehicles are the largest sources of CO, $NO_x$, and VOCs based on data from USEPA's 2008 National Emission Inventory. $PM_{10}$ and $PM_{2.5}$ emissions are emitted primarily by fugitive dust sources. $PM_{2.5}$ is also emitted by electricity generation and wood combustion. $SO_2$ is emitted primarily by industrial sources. Lead is not included in Table 3-6 because it is emitted in small quantities.

**Table 3-6 Largest 2008 Emission Sources by Pollutant**

| Pollutant / Sector | | Emissions (tons/year) | Emission Percentage (%) |
|---|---|---|---|
| CO | Mobile on-road vehicles | 34,445 | 63% |
| | Mobile non-road vehicles | 12,711 | 23% |
| | Fuel combustion | 4,175 | 8% |
| | Other sources | 3,600 | 7% |

| Pollutant / Sector | | Emissions (tons/year) | Emission Percentage (%) |
|---|---|---|---|
| | **Total** | **54,931** | **100%** |
| $NO_x$ | Mobile on-road vehicles | 4,166 | 26% |
| | Electricity generation | 2,417 | 15% |
| | Industrial boilers | 1,938 | 12% |
| | Other sources | 7,547 | 47% |
| | **Total** | **16,068** | **100%** |
| $PM_{10}$ | Unpaved road fugitive dust | 26,234 | 80% |
| | Paved road fugitive dust | 2,170 | 7% |
| | Construction fugitive dust | 1,889 | 6% |
| | Other sources | 2,399 | 7% |
| | **Total** | **32,692** | **100%** |
| $PM_{2.5}$ | Unpaved road fugitive dust | 2,615 | 58% |
| | Electricity generation | 342 | 8% |
| | Fuel combustion (wood) | 273 | 6% |
| | Other sources | 1,303 | 29% |
| | **Total** | **4,533** | **100%** |
| $SO_2$ | Electricity generation | 4,920 | 60% |
| | Chemical manufacturing | 1,546 | 19% |
| | Petroleum refining | 1,244 | 15% |
| | Other sources | 437 | 5% |
| | **Total** | **8,147** | **100%** |
| VOC | Mobile on-road vehicles | 1,751 | 20% |
| | Mobile non-road vehicles | 1,649 | 18% |
| | Petroleum refining | 1,311 | 15% |
| | Other sources | 4,238 | 47% |
| | **Total** | **8,949** | **100%** |

**Note:**
Source: Derived from USEPA 2011e.

### 3.2.1.16 Air Quality Related Values

AQRVs include visibility or a specific scenic, cultural, physical, biological, ecological, or recreational resource identified for a particular area. Air pollution can impact AQRVs through ambient exposure to elevated atmospheric concentrations, such as ozone effects to vegetation, through impairment of scenic views by pollution particles in the atmosphere, and through deposition of air pollutants, such as sulfur and nitrogen compounds, on the earth's surface

through precipitation or dry deposition. AQRVs on federal lands are identified and managed within the respective jurisdictions of several land management agencies, including the US Forest Service (USFS), National Park Service (NPS), and US Fish and Wildlife Service (USFWS), and the BLM. Class I areas are afforded specific AQRV protection under the Clean Air Act. Under NEPA, Class II areas may be analyzed to assess AQRV impacts if they are identified as sensitive Class II areas.

No Class I areas are located within the BiFO. However, the Northern Cheyenne Indian Reservation is adjacent to the eastern boundary of the BiFO, and other Class I areas are located nearby as shown in Table 3-7. Sensitive Class II areas include the Crow Indian Reservation located within the planning area boundary. Potential sensitive Class II areas within the planning area include the Bighorn Canyon National Recreation Area and several National Wildlife Refuges (NWR). Sensitive Class II areas will be identified in the final RMP/EIS based on information provided by the relevant agencies.

**Table 3-7 Class I and potential sensitive Class II Areas in or near the BiFO**

| Class I Area | Acres | Jurisdictional Agency |
|---|---|---|
| North Absaroka Wilderness | 351,104 | USFS |
| Northern Cheyenne Indian Reservation | 444,000 | Tribal |
| U. L. Bend Wilderness Area | 20,890 | USFWS |
| Wind Cave National Park | 28,060 | NPS |
| Yellowstone National Park | 2,020,625 | NPS |
| **Potential Sensitive Class II Areas** | | |
| Bighorn Canyon National Recreation Area | 120,296 | NPS |
| Halfbreed Lake NWR | 4,318 | FWS |
| Hailstone NWR | 920 | FWS |
| Lake Mason NWR | 1,250 | FWS |

**Note:**
Source: USEPA 2010c.
NWR = National Wildlife Refuge

### 3.2.1.17 Deposition

Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems. Deposition is reported as the mass of material deposited on an area in a given period (e.g., kilogram per hectare per year [kg/ha-yr]). Wet deposition refers to air pollutants deposited by precipitation, such as rain and snow. One expression of wet deposition is precipitation pH, a measure of the acidity or alkalinity of the precipitation. Dry deposition refers to gravitational settling of particles and adherence of gaseous pollutants to soil, water, and vegetation. Total deposition refers to the sum of airborne material transferred to the Earth's surface by both wet and dry deposition.

Total nitrogen deposition is calculated by summing the nitrogen portion of wet and dry deposition of nitrogen compounds, and total sulfur deposition is calculated by summing the sulfur portion of wet and dry deposition of sulfur compounds.

The normal range of precipitation pH is 5.0–5.6 (Seinfeld 1986). At Little Bighorn Battlefield National Monument, 2010 annual average precipitation pH was approximately 5.4 (NADP 2011). The planning area has low nitrate, sulfate, and ammonium deposition compared to the rest of the United States.

Atmospheric deposition can cause acidification of lakes and streams. One expression of lake acidification is the change in acid neutralizing capacity, the lake's capacity to resist acidification from atmospheric deposition. Acid neutralizing capacity is expressed in units of micro-equivalents per liter (μeq/L). Lakes with acid neutralizing capacity values of between 25 to 100 μeq/L are considered to be sensitive to atmospheric deposition, lakes with acid neutralizing capacity values of between 10 to 25 μeq/L are considered to be very sensitive, and lakes with acid neutralizing capacity values of less than 10 are considered to be extremely sensitive (Fox et al. 1989).

### 3.2.1.18 Visibility

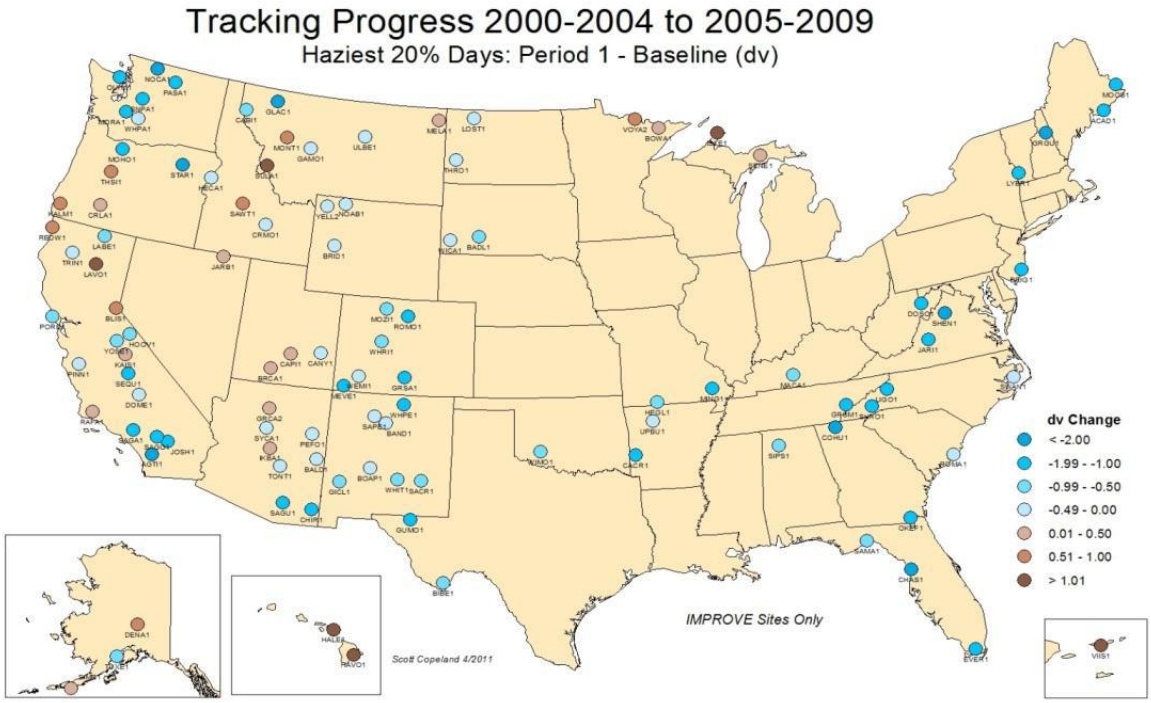
Visibility is a measure of how far and how well an observer can see a distant and varied scene. Pollutant particles in the atmosphere can impair scenic views, degrading the contrast, colors, and distance an observer is able to see. Light extinction is used as a measure of visibility and is calculated from the monitored components of fine particle mass (aerosols) and relative humidity. Light extinction is expressed in terms of deciviews, a measure for describing perceived changes in visibility. One deciview is defined as a change in visibility that is just perceptible to an average person, which is approximately a 10-percent change in light extinction. To estimate potential visibility impairment, monitored aerosol concentrations are used to estimate visibility conditions for each monitored day. Aerosol species affecting visual range include ammonium sulfate, ammonium nitrate, organic mass, elemental carbon, soil elements, and coarse mass.

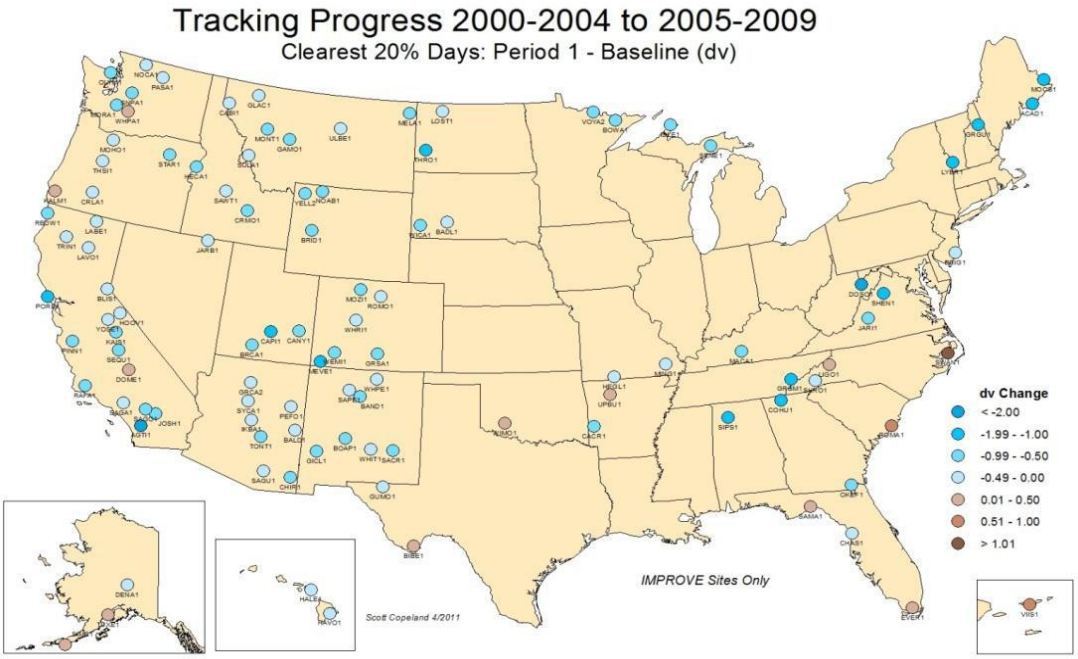
Daily visibility values are ranked from clearest to haziest and divided into three categories to indicate the mean visibility for all days (average), the 20 percent of days with the clearest visibility (20 percent clearest), and the 20 percent of days with the worst visibility (20 percent haziest). Visibility can also be defined by standard visual range (SVR), which is the farthest distance at which an observer can see a black object viewed against the sky above the horizon; the larger the SVR, the cleaner the air. Since 1980, the Interagency Monitoring of Protected Visual Environments (IMPROVE) network has measured visibility in national parks and wilderness areas.

The average standard visible range at the Northern Cheyenne Indian reservation IMPROVE monitor was 58 miles during the average haziest 20 percent of days and 171 miles during the clearest 20 percent of days. Similar standard visual range data are 76 and 182 miles at Yellowstone National Park, and 57 and 168 miles at the UL Bend National Wildlife Refuge.

Visibility has remained relatively constant over recent years in the planning area and nearby areas. Standard visual range trends at Class I areas near the BiFO are shown in Figure 3-3 – Visibility Trends During the 20 Percent Worst and 20 Percent Best Days. From 2005 through 2009, visibility on the 20 percent worst visibility days improved slightly near the planning area. When the 20 percent best visibility days are considered, visibility improved throughout central Montana and northwestern Wyoming.

**Figure 3-3 Visibility Trends on the Best and Worst Visibility Days (2005-2009)**






**Note:**
Source: IMPROVE 2011

### 3.2.1.19 Smoke Management

Smoke contains large quantities of CO and particulate matter. Smoke management for prescribed fire activity in the study area is managed by the Montana/Idaho Airshed Group (more information is available at http://www.smokemu.org/) under the authority of the Montana Open Burning Regulations (ARM Title 17, Section 8, Subchapter 6). The planning area is located in Airsheds 9 and 10 (Map 3).

## 3.2.2 Climate

The topography of the state plays an important role in Montana's climate and creates a variable climate in the BiFO planning area. The Continental Divide exerts a marked influence on the climate of adjacent areas. West of the Divide the climate might be termed a modified northern Pacific coast type, while to the east, climatic characteristics are decidedly continental. The continental climate of eastern Montana is characterized by light precipitation totals, abundant sunshine, low relative humidity, and a relatively large annual and diurnal temperature range. A climate summary for Billings, Montana is presented in Table 3-8.

**Table 3-8 Monthly Climate Summary for Billings, Montana**

| Period of Record: 7/1/1948 to 8/31/2009 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sept | Oct | Nov | Dec | Annual |
| Average Max. Temperature (F) | 32.8 | 39.1 | 46.0 | 56.8 | 67.1 | 76.8 | 86.7 | 85.1 | 72.6 | 60.3 | 45.1 | 35.9 | 58.7 |
| Average Min. Temperature (F) | 14.3 | 19.6 | 25.0 | 34.0 | 43.4 | 51.7 | 58.4 | 56.8 | 47.0 | 37.3 | 26.1 | 18.1 | 36.0 |
| Average Total Precipitation (in.) | 0.73 | 0.59 | 1.06 | 1.77 | 2.27 | 2.04 | 1.10 | 0.84 | 1.31 | 1.18 | 0.71 | 0.65 | 14.26 |
| Average Total Snowfall (in.) | 10.2 | 7.4 | 10.4 | 8.7 | 1.7 | 0.0 | 0.0 | 0.0 | 1.1 | 4.2 | 6.6 | 8.7 | 58.9 |
| Average Snow Depth (in.) | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 |

**Note:**
Source: Western Regional Climate Center 2009.

### 3.2.2.1 Temperature

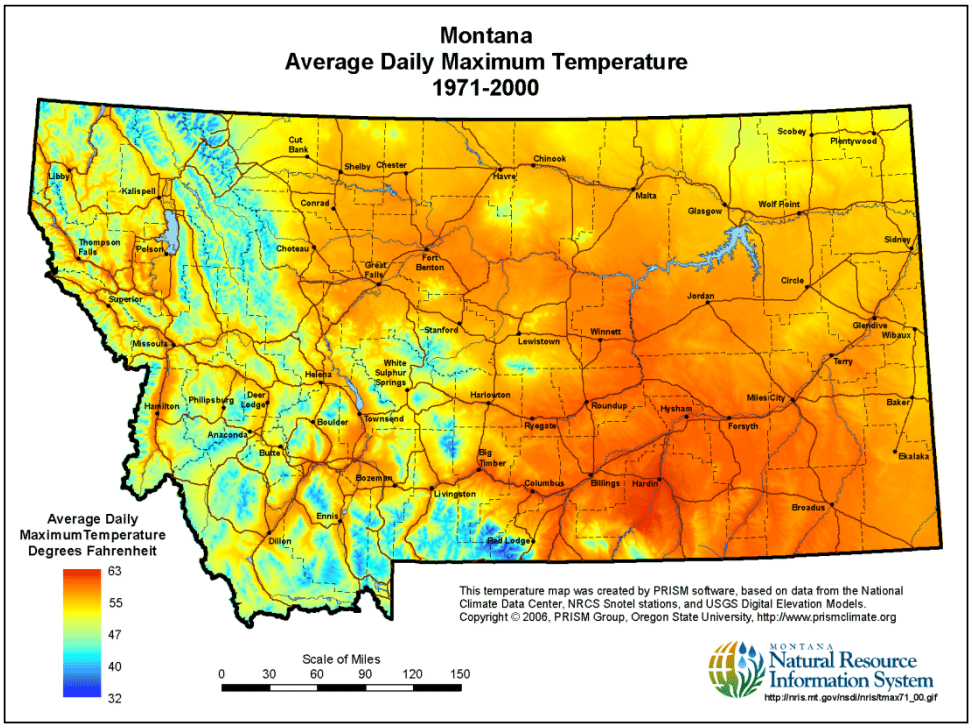
Winters in the planning area, while usually cold, have few extended cold spells. Between cold waves there are periods, sometimes longer than 10 days, of mild but often windy weather. These warm, windy winter periods occur almost entirely along the eastern slopes of the Divide and are known as chinooks. The so-called chinook belt extends from the Browning-Shelby area southeastward to the Yellowstone Valley above Billings. Through this belt, chinook winds frequently reach speeds of 25 to 50 mph or more and can persist, with few interruptions, for several days. In January, the coldest month, temperature averages range from 11° Fahrenheit (F) for the Northeastern Division to 22°F for the South Central (upper Yellowstone Valley) Division. In some areas east of the Continental Divide, January or February can average zero or below, however such occurrences range from infrequent to approximately once in 10 to 15 years in the coldest spots.

January is also the coldest month for Billings, with average day time high temperatures in the low 30s, and average night time low temperatures in the teens. Overnight lows below zero are fairly common during winter, and record low temperatures for all six of the cooler season months from October through March are below 0°F. However, nearly as common as these coldest temperatures, the region also experiences warm down slope winds fairly frequently during the winter. This is clear in the high temperatures recorded in Billings, where the daily maximum record is nearly at or above 70°F for each of these six colder months. The coldest temperature on record at Billings was -32°F on Christmas Eve, 1983, while the warmest high temperature in January is 68°F recorded on January 11, 1953.

Most Montana lakes freeze over every winter. All rivers carry floating ice during the late winter or early spring. Few streams freeze solid; water generally continues to flow beneath the ice. During the coldest winters, anchor ice, which builds from the bottom of shallow streams, may on rare occasions create flooding.

During the summer, hot weather occurs fairly often in the planning area. In Billings, July and August are the warmest months with average daytime highs in the upper mid 80s. This midsummer warmth is fairly steady, seldom severe, and is tempered by normal night time temperatures in the 50s and 60s. Generally, adequate moisture permits rapid plant and crop development during most growing seasons. The hottest temperature recorded at the Billings station was 108°F occurring on July 14, 2002. Figure 3-4 - Montana Average Daily Maximum Temperature shows state wide average daily maximum temperature.

**Figure 3-4 Montana Average Daily Maximum Temperature**




**Note:**
Source: NRIS 2011a.

## 3.2.2.2 Precipitation

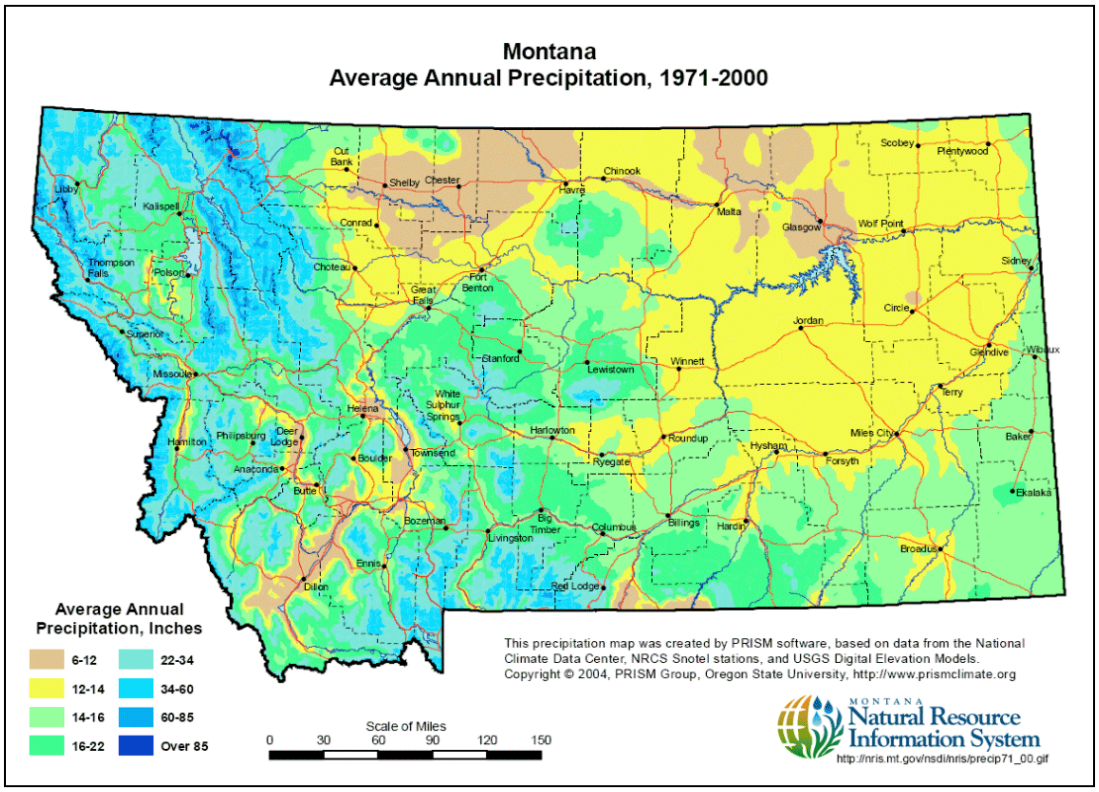
Precipitation varies widely and seasonally, and over the mountainous areas depends largely on topographic influences. Areas on the windward side of mountain ranges are generally the wettest. On the eastern plains, as seen in the Billings records, there are two peaks in the average monthly rainfall, the primary one in May and a second less pronounced peak in September. Most annual precipitation comes as rain, and daily total precipitation seldom exceeds one inch. During the spring, precipitation events are associated with larger scale weather systems that bring widespread snow and rain to the eastern plains. Summer rains fall almost entirely during brief, but frequently intense thunderstorms.

Within the planning area, an area surrounding Clarks Fork of the Yellowstone River in Carbon County is one of the driest portions of Montana. In this area, 8 miles south-southwest of Belfry, the average precipitation for a 16-year period was 6.59 inches.

Annual snowfall varies from 300 inches in mountain areas in the western half of the state, to around 20 inches at some stations in the two northern Divisions east of the Continental Divide. Most snow falls during November to March, with heavy snowstorms that can occur as early as mid-September or as late as May 1 in the higher southwestern half of the state. In eastern sections, early or late season snows are not common. Figure 3-5 - Montana Average Annual Precipitation depicts the state wide average annual precipitation.

The greatest volume of flow of Montana's rivers occurs during the spring and early summer months with the winter snowpack melt. Heavy rains falling during the spring thaw constitute a serious flood threat. Ice jams may occur during the spring breakup, usually in March, and cause backwater flooding. Flash floods, although restricted in scope, are probably the most numerous and result from locally heavy rainstorms in the spring and summer. Damaging floods in Montana have occurred in 1952, 1953, 1964, and 2011.

**Figure 3-5 Montana Average Annual Precipitation**




**Note:**
Source: NRIS 2011a.

### 3.2.2.3 Other Climatic Features

Severe storms of various types occur in the planning area; however the most troublesome are hailstorms that cause crop and property damage of approximately $5 million on an average annual basis. This amount is not unusually large for an area of 146,316 square miles, and hail storm occurrence is limited mainly to July and August, infrequently in June and September.

Tornadoes develop infrequently (approximately two per year) and occur almost entirely east of the Divide, mostly in the eastern third of the state. Local but severe windstorms can occur east of the Divide, from a few to several times a year. Drought in its most severe form is not common, but dry years do occur. All parts of the state rarely suffer from dryness at the same time.

In spite of figures that indicate cold winters, growing seasons (freeze-free periods) are four months or more in much of the agricultural area. In parts of the middle Yellowstone Valley, in fact, the freeze-free period runs as long as the 150 day average at Miles City. Much of the state has average freeze-free periods longer than 130 days, allowing plenty of time for growing a wide variety of crops.

#### 3.2.2.4 Climate Change

Climate is the combination of temperature, humidity, atmospheric pressure, wind, rainfall, sunshine, cloudiness, and other meteorological characteristics in a given region over a long period of time. Climate differs from weather, which is the present condition of these characteristics and their variations over shorter periods. Climate change involves long-term trends indicating a noticeable shift in climate.

Primary climate indicators that can be monitored include ambient air temperature, atmospheric pressure, wind, relative humidity, precipitation amounts and timing, annual snow pack levels, stream flow volume and timing, and solar radiation.

The Intergovernmental Panel on Climate Change (IPCC) concluded "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very *likely* due to the observed increase in anthropogenic greenhouse gas concentrations." Chapter 9 of Working Group I of the 2007 IPCC Report (IPCC 2007) addressed the causes of climate change. Some of the conclusions included: 1) human-induced warming of the climate system is widespread, 2) "it is *likely*" that there has been a substantial anthropogenic contribution to surface temperature increases since the mid-20th century, and 3) surface temperature extremes have "*likely*" been affected by anthropogenic forcing. As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty because they are based on well-known physical laws and document trends (USEPA 2008).

The temperature of the planet's atmosphere is determined by the amount of solar radiation absorbed by the earth and its atmosphere. GHGs (primarily carbon dioxide [$CO_2$], methane, and nitrous oxide [$N_2O$]) increase the earth's temperature by reducing the amount of solar energy that re-radiates back into space. In other words, more heat is trapped in the earth's atmosphere when atmospheric concentrations of GHGs are greater. While GHGs have occurred naturally for millennia and are necessary for life on earth, increased atmospheric concentrations of GHGs as well as land use changes are contributing to an increase in average global temperature (USEPA 2007). This warming is associated with climatic variability that exceeds the historic norm and is known as climate change. Extensive explanations of climate change causes and

effects are provided in the *Climate Change Supplementary Information Report: Montana, North Dakota, and South Dakota Bureau of Land Management* (BLM 2010a), IPCC Fourth Assessment (IPCC 2007), *Climate Change Indicators in the United States* (USEPA 2010e), and *Global Climate Change Impacts in the United States* (USGCRP 2009).

Annual GHG emissions for Montana, the United States, and the world are summarized in Table 3-9. Annual emissions of GHGs are usually quantified in units of metric tons (mt). A metric ton is equivalent to approximately 2,005 pounds (1.102 short tons). The combined effect of emissions of multiple GHGs is reported in terms of carbon dioxide equivalent ($CO_2e$), which is calculated by multiplying emissions by a global warming potential (GWP) number that takes into account each gas' atmospheric longevity and its heat-trapping capability. The GWP of $CO_2$ is set at 1. USEPA determined other GHGs' relative climate change potentials over a 100-year time period. In USEPA regulations, GWPs for methane and $N_2O$ are 21 and 310, respectively. Other organizations, such as the IPCC, have set slightly different GWPs.

Planning area GHG emission sources include combustion equipment such as heaters and engines, oil and gas development and production, coal mining, fire events, motorized vehicle use (construction equipment, cars and trucks, and off-highway vehicles), livestock grazing, facilities development, and other equipment exhaust and fugitive emissions. Contributions to climate change also result from land use changes (conversion of land to less reflective surfaces that absorb heat, such as concrete or pavement), changes in vegetation, and soil erosion (which can reduce snow's solar reflectivity and contribute to faster snowmelt). Emission controls on some sources can reduce GHG emissions.

**Table 3-9 Estimated Annual GHG Emissions**

| Entity | Data Year | $CO_2e$ Emissions ($10^6$ mt) |
|---|---|---|
| Montana[2] | 2007 | 50.4 |
| United States[3] | 2009 | 6,633 |
| Global[4] | 2004 | 49,000 |

**Note:**
1 Emissions exclude GHG emissions and sequestration due to land use and land use changes.
2 World Resources Institute Climate Analysis Tool (WRI 2011).
3 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009 (USEPA 2011b).
4 Climate Change 2007: Synthesis Report (IPCC 2007).

Global atmospheric concentrations of GHGs are determined by the quantity of GHGs emitted to and removed from the atmosphere. Global concentrations of $CO_2$, methane, and $N_2O$ in 2009 were 387 parts per million (ppm), 1,744 parts per billion (ppb), and 323 ppb, respectively (USEPA 2011a). Atmospheric concentrations of $CO_2$ can be reduced by carbon storage in forests, woodlands, and rangelands, as well as in underground carbon sequestration projects. Vegetation management can provide a source of $CO_2$ (e.g., prescribed burns) or it can provide a sink of $CO_2$ through vegetation growth. The net storage or loss of carbon on rangelands and

grasslands in the planning area is generally small and difficult to estimate or measure. Most soils within the planning area contain relatively little organic matter compared to forest soils, and forests and woodlands make up approximately 7 percent of the total acres on public lands in the planning area.

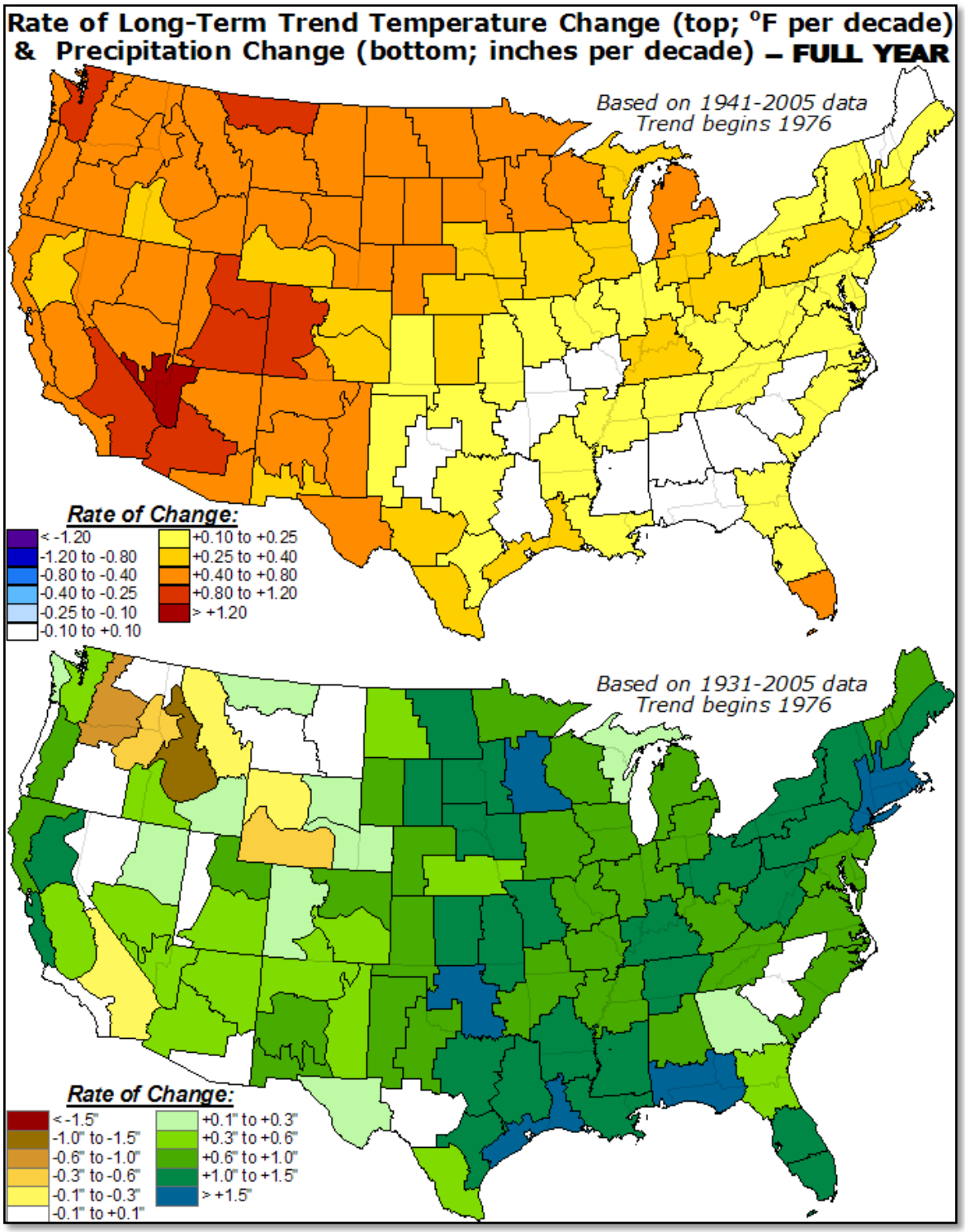
#### 3.2.2.4.1 Climate Change Trends

Climate change trends include two types of trends: historic and predicted. Historic trends describe climate changes that have already been observed. Predicted climate change indicates modeled future changes based on assumptions of future global GHG emission and resulting environmental effects. Climate change will continue into the future even if GHG emissions remain at current levels or decrease. Long lag times are associated with the massive thermal energy stored in oceans, which can take decades, or even centuries, to adjust to climate changes (USEPA 2010e). In addition, the long lifetimes of many GHGs contribute to committed climate change. For example, $CO_2$ typically remains in the atmosphere for 50–200 years, depending on how long it takes $CO_2$ molecules to be absorbed by plants, land, or the ocean. $N_2O$ is also long-lived; it remains in the atmosphere for approximately 120 years. In contrast, methane has a shorter lifetime and remains in the atmosphere for approximately 12 years (USEPA 2010e). Additional types of GHGs also contribute to climate change, but their impact is substantially less due to their relatively small concentrations in the atmosphere.

#### 3.2.2.4.2 Temperature and Precipitation

Historical global mean surface temperatures have increased nearly 1.3°F from 1906 through 2008 (GISS and Sato 2010). Northern latitudes (above 23.6 through 90.0° N) have exhibited greater temperature increases of nearly 2.1°F since 1900, with nearly a 1.8 °F increase since 1970 alone (GISS and Sato 2010). In the planning area, data from 1941 through 2005 indicate a long-term temperature increase between 0.40 to 0.80 °F per decade since 1976, as shown in Figure 3-6 – Long-Term Historical Temperature and Precipitation Trends. Over a recent 32-year period, planning area observed winter temperatures increased up to 7°F (USGCRP 2009). With regard to precipitation, data from 1931 through 2005 indicate little change in total annual precipitation in eastern Montana since 1976. However, the timing of precipitation may have changed.

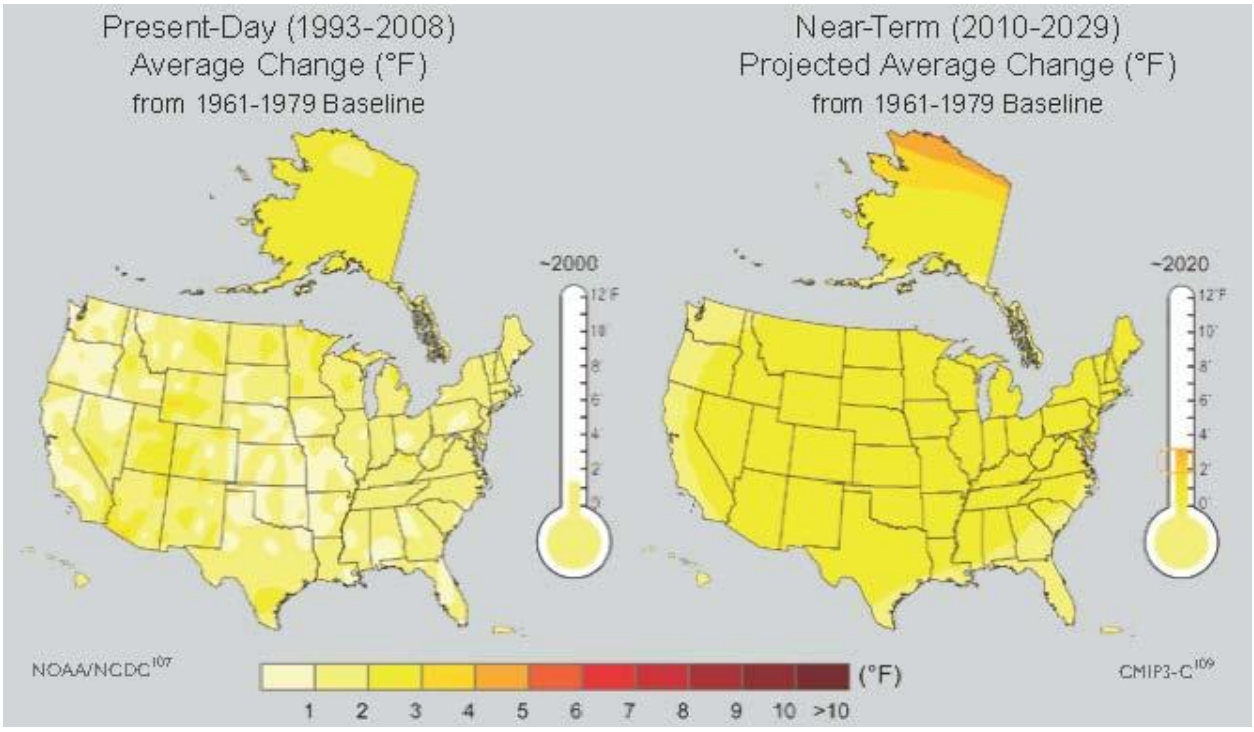
**Figure 3-6 Long-Term Historical Temperature and Precipitation Trends**




**Note:**
Source: NOAA 2010a

Predictions of future temperature changes compared to a 1961–1979 baseline indicate that temperatures in the planning area may increase 2–3°F by 2010–2029, as shown in Figure 3-7 – Near-Term Predicted Temperature Increases. Temperatures are predicted to continue increasing through the century by 3–5°F by the mid-twenty-first century and increase by 5–9°F by the end of the century, compared to the 1961–1979 baseline (USGCRP 2009). The lower end of these ranges is based on a lower future GHG emission scenario, while the upper end of the ranges is based on a higher GHG emission scenario. Along with generally increasing temperatures, many more days are predicted to have maximum temperatures greater than 100°F (USGCRP 2009). In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 2.5 to 10.4°F above 1990 levels (IPCC 2001). Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Rising temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events.

**Figure 3-7 Near-Term Predicted Temperature Increases**




**Note:**
Source: USGCRP 2009.

Prediction of future precipitation changes from the recent past to 2080–2099 indicate that precipitation in the planning area will increase 15–20 percent in winter and spring and will decrease no more than 5 percent in summer. During fall, precipitation in the northern part of the

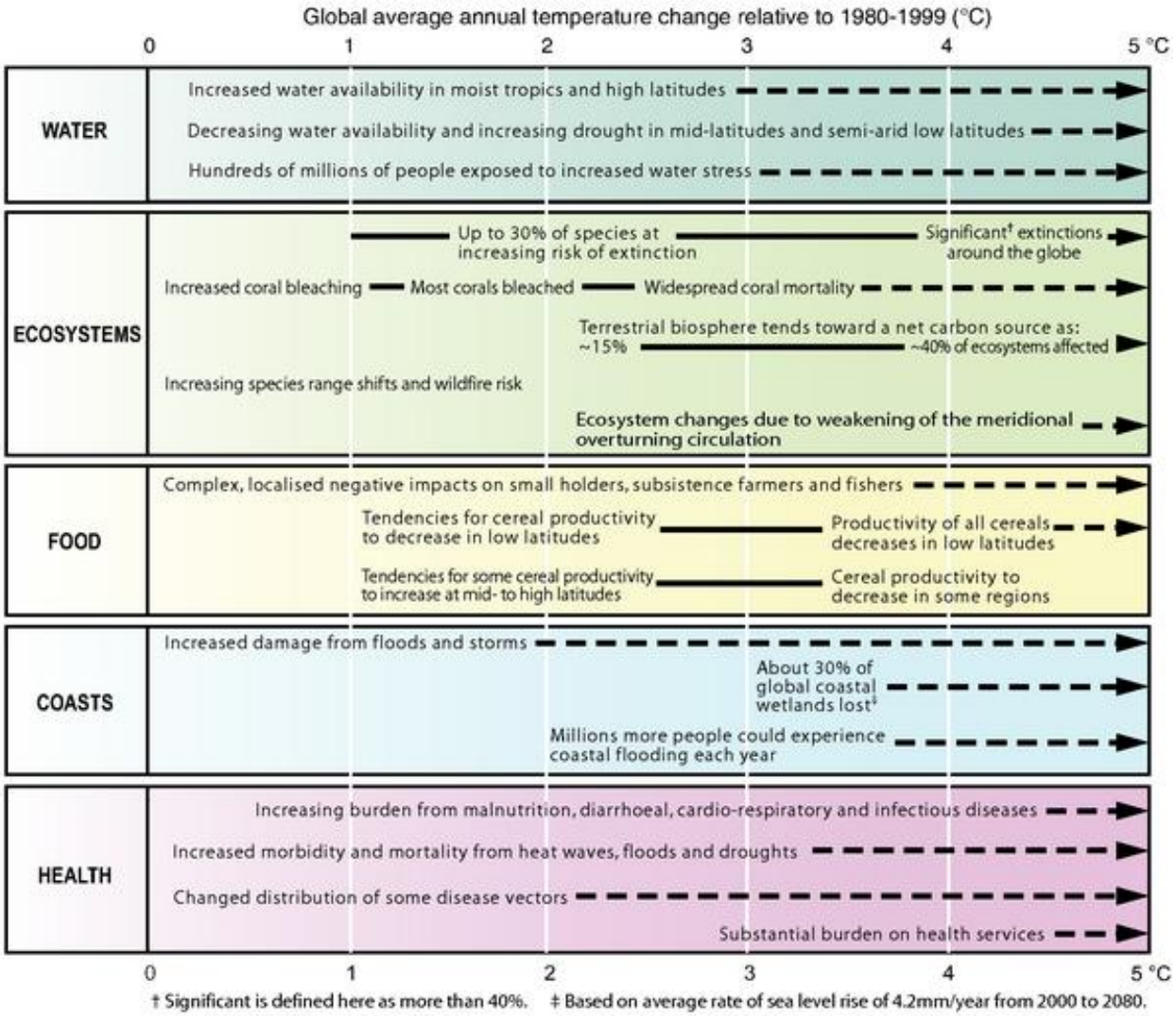
planning area will increase by up to 5 percent while the southern portion of the planning will experience a 0–5 percent decrease (USGCRP 2009).

In addition to temperature and total precipitation changes, predicted climate changes include changes in precipitation timing by season and an increase extreme rainfall events and other extreme weather events. Due to warming temperatures melting glaciers and thermal expansion within the seawater, ocean levels are expected to rise. These changes will affect a broad array of ecosystems and affect food supplies and human health.

#### 3.2.2.4.3 Climate Change Effects on Resources

Climate change affects nearly all resources at local, regional, and global levels. The effects of climate change are so widespread that they cannot all be described in this RMP. To illustrate the effects of global temperature change, Figure 3-8 – Examples of Resource Impacts Due to Climate Change provides broad examples of climate change impacts. As global temperatures increase, effects on resources become more significant.

**Figure 3-8 Examples of Resource Impacts Due to Climate Change**




Temperature and precipitation changes could directly affect air quality. Air quality would be improved if increased precipitation reduces wind-blown dust, but would be degraded if dry periods cause increased particulate emissions. Ground-level ozone may also be affected. High temperatures are a contributing factor in ground-level ozone formation, which is highly dependent on $NO_x$ and VOC concentrations. End-of-century ozone concentrations in the planning area are predicted to decrease during the months of June through August based on a lower GHG emission scenario and increase based on a higher emission scenario (USGCRP 2009).

Climate change will affect water quality in the planning area. Increasing temperatures in the planning area are likely to contribute to increased evaporation, drought frequencies, and declining water quantity. The warming of lakes and rivers will adversely affect the thermal structure and water quality of hydrological systems, which will add additional stress to water

resources in the region (IPCC 2007). The planning area depends on temperature-sensitive springtime snowpack to meet demand for water from municipal, industrial, agricultural, recreational uses and BLM authorized activities. The USGS notes that mountain ecosystems in the western United States are particularly sensitive to climate change. Higher elevations, where much of the snowpack occurs, have experienced three times the global average temperature increase over the past century (USGS 2010). Higher temperatures are causing more winter precipitation to fall as rain rather than snow, which contributes to earlier snowmelt. Additional declines in snowmelt associated with climate change are projected, which would reduce the amount of water available during summer (USGCRP 2009). Rapid spring snowmelt due to sudden and unseasonal temperature increases can also lead to greater erosive events and unstable soil conditions.

Increases in average summer temperatures and earlier spring snowmelt in the planning area are expected to increase the risk of wildfires by increasing summer moisture deficits (USGCRP 2009). Studies have shown that earlier snowmelts can lead to a longer dry season, which increases the incidence of catastrophic fire (Westerling 2006). Together with historic changes in land use, climate change is anticipated to increase the occurrence of wildfire throughout the western United States. Predicted climate change impacts to wildfires show large increases in the annual average acreage burned. Based on modeling that assumed a 1°C (1.8°F) increase in global average temperature, a 393 percent increase in acreage burned in wildfires is predicted in the planning area (USGCRP 2009). Air quality, ecosystem, and economic impacts from wildfires are extensive. Wildfires also release large quantities of $CO_2$ that would increase atmospheric GHG concentrations.

There is evidence that recent warming is affecting terrestrial and aquatic biological systems (IPCC 2007). Warming temperatures are leading to earlier timing of spring events such as leaf unfolding, bird migration, and egg-laying (IPCC 2007). The range of many plant and animal species has shifted poleward and to higher elevation, as the climate of these species' traditional habitat changes. As future changes in climate are predicted to be even greater past changes, there will likely be even larger range shifts in the coming decades (Lawler 2009). Warming temperatures are also linked to earlier vegetation growth in the spring and longer thermal growing seasons (IPCC 2007). In aquatic habitats, increases in algal abundance in high-altitude lakes have been linked to warmer temperatures, while range changes and earlier fish migrations in rivers have also been observed (IPCC 2007). Climate change is likely to combine with other human-induced stress to further increase the vulnerability of ecosystems to additional pests, additional invasive species, and loss of native species. Climate change is likely to affect breeding patterns, water and food supply, and habitat availability to some degree. Sensitive species in the planning area, such as the sage grouse, which are already stressed by declining habitat, increased development, and other factors, could experience additional pressures because of climate change.

More frequent flooding events, erosion, wildfires, and hotter temperatures pose increased threats to cultural and paleontological sites and artifacts. Heat from wildfires, suppression activities, and equipment, as well as greater ambient daytime heat can damage sensitive cultural resources. Similarly, flooding and erosion can wash away artifacts and damage cultural and

paleontological sites. However, these same events may also uncover and lead to discoveries of new cultural and paleontological localities.

Climate change also poses challenges for many resource uses on BLM-administered land. Increased temperatures, drought, and evaporation may reduce seasonal water supplies for livestock and could impact forage availability. However, in non-drought years, longer growing seasons resulting from thermal increases may increase forage availability throughout the year. Shifts in wildlife habitat due to climate change may influence hunting and fishing activities, and early snowmelt may affect winter and water-based recreational activities. Drought and resulting stress on vegetation is likely to increase the frequency and intensity of mountain bark beetle and other insect infestations, which further increases the risk of fire and reduces the potential for sale of forest products on BLM-administered lands.

#### 3.2.2.4.4 Actions to Reduce GHGs

U.S. GHG emissions are expected to decline due to USEPA's listing of GHGs as a regulated air pollutant and implementation of several recent GHG regulatory programs. Facilities with large emissions of GHGs must report these emissions to USEPA and new facilities with large expected GHG emissions must obtain air quality permits and potentially control GHG emissions.

Within the US Department of the Interior (USDI), several initiatives have been launched to improve the ability to understand, predict, and adapt to the challenges of climate change. The Secretary of the Interior signed Secretarial Order 3289 on February 22, 2010, establishing a Department-wide, scientific-based approach to increase understanding of climate change and to coordinate an effective response to impacts on managed resources. The order reiterated the importance of analyzing potential climate change impacts when undertaking long-range planning issues, and also established several initiatives including the development of eight Regional Climate Science Centers. Regional Climate Science Centers would provide scientific information and tools that land and resource managers can apply to monitor and adapt to climate changes at regional and local scales (USDI 2010). The North Central Climate Science Center, which will incorporate the planning area, has a target establishment date of 2011.

Given the broad spatial influence of climate change, which requires response at the landscape-level, the USDI also established Landscape Conservation Cooperatives, which are management-science partnerships that help to inform management actions addressing climate change across landscapes. These Cooperatives are formed and directed by land, water, wildlife and cultural resource managers and interested public and private organizations, designed to increase the scope of climate change response beyond federal lands.

Rapid ecoregional assessments are one of the tools the BLM uses to monitor and respond to the effects of climate change. Ecoregional assessments are geospatial landscape evaluations that are designed to identify areas of high ecological value within an ecoregion that may warrant conservation, adaptation, or restoration. These assessments can help to identify resources that are being impacted by climate change and provide information to facilitate the subsequent development of an ecoregional conservation strategy for plants, wildlife and fish communities on public lands. Ecoregional assessments can identify areas, species, and ecological features

and services that are sensitive to ecosystem instability and changes in climatic conditions. One of the objectives of the BLM rapid ecoregional assessments is to provide guidance for adaptation and mitigation planning in response to climate change.

In addition to efforts being undertaken to better respond and adapt to climate change, other federal initiatives are being implemented to mitigate climate change. The Carbon Storage Project was implemented to develop carbon sequestration methodologies for geological (i.e., underground) and biological (e.g., forests and rangelands) carbon storage. The project is a collaboration of federal agency and external stakeholders to enhance carbon storage in geologic formations and in plants and soils in an environmentally responsible manner. The Carbon Footprint Project is a project to develop a unified GHG emission reduction program for the USDI, including setting a baseline and reduction goal for the Department's GHG emissions and energy use. More information about USDI's efforts to respond to climate change is available from www.doi.gov/archive/climatechange/.

# 3.3 Geology

## 3.3.1 Geologic Setting

Mountain ranges in the BiFO planning area include the Absaroka-Beartooth, Big and Little Snowy, Pryor, Crazy, and Bull mountains. Rock uplift and resultant erosion has exposed the core of these ranges, providing evidence of their structures and the forces which produced them (Figure 3-9- Stratigraphic Column). The Absaroka-Beartooth range forms a large rectangular block of rock 80 miles long and 40 miles wide. Rocks are predominantly Precambrian metamorphic rocks, up to 3.1 billion years old. These rocks were once shale, limestone, and sandstone that were altered to gneisses, schists, marble, and quartzite by high temperatures and pressures of burial deep beneath the earth's crust. Rocks in this range have been uplifted several thousand feet along faults, folding the overlying Paleozoic and Mesozoic sedimentary rock. Along the Beartooth Front south of Red Lodge and up the Boulder River, sedimentary rocks have been tilted to a nearly vertical position.

The Pryor Mountains were developed through generally vertical uplift of deep seated Precambrian basement rocks. The overlying strata fractured into five distinct blocks, with high angle faults on their north and west flanks. Paleozoic and Lower Mesozoic rocks outcrop over most of the range. Only on the East Pryor Mountain fault block was the uplift sufficient to bring these basement rocks to the surface (Blackstone 1975). West of the Pryor Mountains, successively younger rocks outcrop, with a dip close to that of the Red Pryor Mountain fault block.

The Snowy Mountains are the most obvious expression of a general uplift that affected all of central Montana. Here, uplift was caused mainly by horizontal compression rather than the vertical forces described above. The strata were folded into a series of anticlines (upfolds) and synclines (downfolds) which provide much of the topographic relief in the region. Devil's Basin is a good example of such an anticline (Reeves 1931).

The Bull Mountains are a series of small, broken plateaus, little more than hills when compared to other mountains in the region. The massive sandstones of the Tongue River Member of the Fort Union Formation and interspersed clinker (formed when coal beds burned) which cap the plateaus, are more resistant to erosion than the soft sandstones and shale which underlie them. The harder rocks are preserved as remnants of higher topographic relief, even though the geologic structure is a basin (Woolsey, et. a1. 1917; Alt and Hyndman 1991).

The Crazy Mountains are unique in that they are the only range in the area formed by the intrusion of molten rock (magma). Magma rose from great depth and was injected into fissures between strata, doming the overlying sediments. Subsequent erosion has exposed this igneous rock, and strata dip away from the mountain core in all directions. Another interesting feature of the Crazy Mountains is the system of dikes (magma injected into cracks through the strata) that radiate outward from the mountains, resembling spokes from the hub of a wheel. The high southern end of the range is one major intrusion, the Big Timber Stock (Alt and Hyndman 1991).

The surrounding plains areas are composed of flat lying or slightly tilted sedimentary rocks deposited during the Cretaceous Period and Paleocene Epoch. Rocks are predominantly shales and sandstones with minor limestone, coal, and bentonite beds. Small anticlines and fault systems associated with the mountain uplifts described above affect the bedding and outcrop pattern of these rocks. Examples include the Crazy Mountain Basin, Lake Basin fault zone, and Nye-Bowler Lineament.

The most recent sedimentary deposits found in the planning area are gravel alluvium. This material often forms benches or terraces. Sources for the material vary, but generally benches develop along mountain foothills through accumulation of outwash from the slow erosion of those ranges. Terraces, on the other hand, represent old stream channels that have been filled with gravel and then abandoned as the streams cut down through their floodplains. No continental glaciations reached this far south in Montana, though alpine glaciers occupied the upper slopes of the mountain ranges. These glaciers left mountain lakes, U-shaped valleys, and mounds of drift as evidence of their passing (Perry 1962).

Overall, sedimentation has been nearly continuous from the Cambrian to the Paleocene (about 500 million years) aggregating over 10,000 feet of rock as shown in Figure 3-9– Stratigraphic Column. Further information can be found at http://www.mbmg.mtech.edu/gmr/gmr-statemap.asp.

**Figure 3-9 Stratigraphic Column**

| | | Formation | | Range of Average Thickness (in feet) | Description |
|---|---|---|---|---|---|
| CENEZOIC | QUARTERNARY | Alluvium | | | Unconsolidated stream and fan deposits range from fine to course grained. |
| CENEZOIC | TERTIARY | Tongue River Member | Fort Union Formation | Up to 2500' | Light yellow sandstone with brown and light-dark gray shale; many coal beds; reddish clinker. |
| CENEZOIC | TERTIARY | Lebo | Fort Union Formation | Up to 2500' | Dark gray shale with orange to purple ironstone concretions and green-gray beds of altered volcanic ash. |
| CENEZOIC | TERTIARY | Tullock | Fort Union Formation | Up to 2500' | Light tan to yellow sandstone with brown shale and tan-gray siltstone; some coal and clinker. |
| MESOZOIC | CRETACEOUS | Hellcreek | | 300-1200' | Fresh water deposits of alternating sandstones and clay shales. |
| MESOZOIC | CRETACEOUS | Fox Hills Sandstone | | 100-200' | Gray to yellowish sandstone and sandy shales. |
| MESOZOIC | CRETACEOUS | Bear Paw | | 900' | Steel-gray to black marine shale containing a few grayish white and dark-red concretions and beds of bentonite. |
| MESOZOIC | CRETACEOUS | Judith River | | 200-400' | Fresh and brackish water deposits consisting of irregularly and thin-bedded gray clayey sand, sandstone, lignite clay and coal beds. |
| MESOZOIC | CRETACEOUS | Cleggett | | 500' | Dark-brownish-black marine shale containing persistent yellow calcareous concretionary beds; bentonite and tan sandstone in the upper part. |
| MESOZOIC | CRETACEOUS | Eagle | | 220' | Massive and thin-bedded buff to white sandstone, carbonaceous shale, and coal beds. |
| MESOZOIC | CRETACEOUS | Telegraph Creek | | 180-300' | Dark gray-black, thin beds of marine shale with thin sandstone members especially near the base; fossiliferous; gypsiferous. |
| MESOZOIC | CRETACEOUS | Niobara | | 200' | Upper part mark lower lightish yellow to whitish limestone. |
| MESOZOIC | CRETACEOUS | Carlisle | | 150-300' | Gray shales with thin shaly to silty sandstone layers, some bentonite, some ironstone concretions. |
| MESOZOIC | CRETACEOUS | Greenhorn | | 600' | Black shales with hard, thin sandstone beds, buff-light gray limestone layers in eastern Montana with interbedded calcareous shales, some bentonite. |
| MESOZOIC | CRETACEOUS | Frontier | | 150-500' | Alternating beds of gray to yellow sandstone and dark carbonaceous shales; contains bentonite beds in Carbon County. Produces gas in Dry Creek field. |
| MESOZOIC | CRETACEOUS | Mowry | | 180-325' | Hard light gray shales and thin-bedded sandstone; contains numerous fish scales; also bentonite mined in Carbon County. |
| MESOZOIC | CRETACEOUS | Thermopolis | | 700-760' | Upper and lower members are thick dark marine shales; middle member yellow-brown sandstone; shales have bentonite beds mined in Carbon County. |
| MESOZOIC | CRETACEOUS | Cloverly / Kootenai | | 160-500' | Upper member – Greybull sandstone; middle multicolored shale member; lower, Pryor conglomerate contains vertebrate fossils and petrified wood. Some uranium mineralization; gas producer in Dry Creek field. |
| MESOZOIC | JURASSIC | Morrison | | 150-200' | Interbedded buff sandstone and gray-green shales; vertebrate fossils; some uranium mineralization |
| MESOZOIC | JURASSIC | Swift | | 10-300' | Green shales and fine-grained thin bedded brown or green sandstone; fossiliferous (marine). |
| MESOZOIC | JURASSIC | Rierdon | | 50-250' | Gray to green marine shales and thin limestone; fossiliferous. |
| MESOZOIC | JURASSIC | Piper | | 0-150' | Red to green shales and limestone with some gypsum |

| | | Formation | | Range of Average Thickness (in feet) | Description |
|---|---|---|---|---|---|
| PALEOZOIC | TRIASSIC | Chugwater / eroded | | 0-800' | Brick-red sandstones, shales and siltstones, often ripple-marked; gypsum bed 20-30' thick. |
| PALEOZOIC | PERMIAN | Embar / eroded | | 5-100' | White porous limestone. Reported gypsum bed; oil producer in Elk Basin field. |
| PALEOZOIC | PENNSYVANIAN | Ten Sleep / quadrant | | 50-105' | White to buff cross-bedded soft sandstone; oil producer in Elk Basin field. |
| PALEOZOIC | PENNSYVANIAN | Amsden | | 150-350' | Red shales, white limestone, chart/limestone breccias; uranium mineralization; contains oil in Central Montana fields. |
| PALEOZOIC | PENNSYVANIAN | Alaska Bench | | 100-150' | Hard gray fossiliferous limestone; exposed in Snowy Mountains. |
| PALEOZOIC | PENNSYVANIAN | Tyler | | 5-100' | White to brick-red cross-bedded channel sandstone; produces oil in Central Montana Field. |
| PALEOZOIC | DEVONIAN | Heath | Big Snowy Group | 150- 500' | Found in Central and Eastern Montana only.<br>Heath: Black shales and black limestone; serves as source rock for petroleum in Central Montana oil/metalliferous shale |
| PALEOZOIC | DEVONIAN | Otter | Big Snowy Group | 150- 500' | Otter: Light green shales and limestone. |
| PALEOZOIC | DEVONIAN | Kibbey | Big Snowy Group | 150- 500' | Kibbey: Red to brown sandstones and shale; some gypsum. |
| PALEOZOIC | MISSISSIPPIAN | Mission Canyon | Madison Group | 600-1200' | Mission Canyon: Massive while or gray (marine) limestone. |
| PALEOZOIC | MISSISSIPPIAN | Lodgepole | Madison Group | 600-1200' | Lodegpole: Thin bedded, cherty, fossiliferous limestone, produces oil in Elk Basin Field. |
| PALEOZOIC | MISSISSIPPIAN | Three Forks | | 200-250' | Multicolored shales with thin dark limestone and yellow sandstone. |
| PALEOZOIC | MISSISSIPPIAN | Jefferson | | 50-600' | Brown to gray and black limestone and dolomite. |
| PALEOZOIC | ORDOVICIAN | Big Horn Dolomite | | 250-300' | Thin Bedded or massive limestones and dolomite; upper portion very fossiliferous. |
| PALEOZOIC | CAMBRIAN | Gros Ventre | | 700' | Greenish and gray calcareous shales and colitic limestones. |
| PALEOZOIC | CAMBRIAN | Flathead | | 185' | Hard dense quartzite with red to brown sandstone. |
| PRECAMBRIAN | PRECAMBRIAN | PreCambrian | | | Gneisses and schists, exposed only near Dryhead area of East Pryor Mountain, and on top of Beartooth Mountains. |

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## 3.4 Soil

BiFO management decisions affect soil on BLM surface and split estate during minerals development. In general, soil management focuses on maintaining soil integrity, reclaiming disturbed soils, minimizing erosion and, in some cases, improving soil health. Detailed soils inventory data are available for a portion of the planning area; however, there are data gaps in the southwest and northwest portions of the planning area. These gaps do not occur on BLM managed surface lands, but only occur on 715 acres of BLM managed split estate. Additionally, while all of the BLM managed surface lands do have detailed soil data, Ecological Site Descriptions (ESDs) are not currently available on 151,211 acres due to several factors including limited soil development and rock outcrop formations.

Major Land Resource Areas (MLRA) are geographically associated land resource units identified by the US Department of Agriculture (USDA) to facilitate regional and national planning. The dominant physical characteristics of the MLRAs describe the similar land use, elevation and topography, climate, water, soils, and potential natural vegetation in a designated area. Soils in the planning area are located in the following MLRAs (Map 5) (USDA 2006).

- 32 – Northern Intermountain Desertic Basin
    - 17 ecological sites are listed within this MLRA
- 43B – Central Rocky Mountain
    - There are no approved ESDs for this MLRA
- 46S – Northern Rocky Mountain Foothills, South
    - 3 ecological sites are listed within this MLRA
- 58AC – Northern Rolling High Plains, Northern Part
    - 21 ecological sites are listed within this MLRA
- 58AE - Northern Rolling Plains, North Part
    - 22 ecological sites are listed within this MLRA

Most of the planning area is in the Northern Rolling High Plains MLRA, an area of old eroded plateaus and terraces. Slopes generally are gently rolling to steep and wide belts of steeply sloping badlands border a few of the larger river valleys. In some areas, flat topped, steep sided buttes rise sharply above the general level of the plains. Elevations range from 2,950 to 3,280 feet and in the mountains reach 6,900 feet. Shale, siltstone, and sandstone underlie much of the area. Marine and continental sediments are found mostly at the higher elevations. The dominant soil orders in this MLRA are Entisols and Inceptisols, and soils are generally shallow to very deep, well drained, and clayey or loamy.

The Northern Rocky Mountain Foothills MLRA, with elevation ranges from 3,600 to 7870 feet, is in the south and northwestern region of the planning area. The foothills east of the Northern Rocky Mountains are on an old plateau of uplifted marine sediments. The rugged hills and low mountains are cut by many narrow valleys with steep gradients. Broad floodplains and fans

border a few of the major rivers. Almost all this area is characterized by marine sediments. These rocks are primarily sandstones and shales with some layers of chalk and conglomerate. The dominant soil orders in this MLRA are Mollisols and Entisols, and soils are shallow to very deep, generally well drained, and loamy or clayey.

Soils in the planning area are derived mainly from sedimentary bedrock and alluvium. Soil depth ranges from shallow to bedrock to very deep. Differences in climate, parent material, topography, and erosion conditions result in soils with diverse physical and chemical properties. An overview of the four geomorphic groups and associated soils in the planning area are presented below.

### 3.4.1 Geomorphic Group One: Shale and Sandstone Uplands

These soils formed in shale and sandstone uplands occurring throughout the area. The depth of soils in this group range from very shallow to deep, and their surface texture is primarily loamy with local areas of clayey or sandy textures. The number of rock fragments and amount of calcium carbonate (from limestone) in these soils vary depending on the bedrock and parent materials associated with each soil type. Terrain is usually gently rolling to very steep, highly dissected landscapes.

### 3.4.2 Geomorphic Group Two: Floodplains, Streams, Terraces, and Fans

This group includes soils that formed on floodplains, stream terraces, and fans found throughout the area. These soils contain deep, nearly level to strongly sloping soils that are well drained to very poorly drained. Soil textures range from loamy fine sand to clay. Rock fragments are more numerous along terrace edges near fast moving water areas. These soils are formed in alluvium dissected by incised water channels.

### 3.4.3 Geomorphic Group Three: High Terraces and Benches

Soils in this group formed on high terraces and benches mainly in Carbon, Musselshell, and Yellowstone counties. These soils comprise deep, well drained soils on nearly level to moderately sloping terrain dissected by deep drainages. Their textures are generally loamy or loamy skeletal (includes rock fragments), and the soils are high in calcium carbonate. Soils are formed in gravel outwash and alluvium from mixed rock sources.

### 3.4.4 Geomorphic Group Four: Mountains and Foothills

This group includes soils from the mountains (Beartooth, Bull, Crazy, Pryor and Snowy) and foothills in the planning area. Soil depths range from very shallow to deep, depending on the proximity to rock outcrops. They are well drained and are on gently sloping to very steep, dissected terrain. The texture is loamy or loamy skeletal with high calcium carbonate in the Pryor and Snowy mountain soils. These soils are formed from material derived from sedimentary, igneous, and metamorphic rocks.

Soil erosion potential and susceptibility to damage can be evaluated using three indicators: T factor, Wind Erodibility Group, and Potential Fire Damage Hazard. T factor is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting soil productivity over a sustained period. Soil erosion is related to soil depth, ground cover, slope, and organic matter content in surface layers. The rate is expressed in tons per acre per year and is usually compared to the actual rate of soil erosion to determine whether the erosion levels are sustainable to soil health and stability. Some soils in the planning area have a high T factor of 1 (Map 7 - T Factor Soils). In areas in Stillwater, Musselshell, and Wheatland counties, soil data inconsistencies make it difficult to summarize soils in that area and may be due to differences in the scale of the existing soil surveys. Further data development should be pursued whenever possible.

A Wind Erodibility Group (WEG) is a grouping of soils with similar properties affecting their susceptibility to wind erosion of bare ground. Soils assigned to group 1 are the most susceptible to wind erosion. Musselshell, Golden Valley, Yellowstone, and Stillwater counties have the most soils susceptible to wind erosion in the planning area (Map 6 - Wind Erodibility Groups).

The third rating indicates the potential hazard of damage to soil nutrients, physical, and biotic characteristics from fire. These ratings are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. Soils are described as having a low, moderate, or high potential for this kind of damage. Ratings indicate an evaluation of the potential impact to soils from prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

A rating of “low” indicates the soil has features that reduce its potential for fire damage. Good performance can be expected, and little or no maintenance is needed. A “moderate” rating indicates the soil has features that result in a moderate potential for fire damage. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. A “high” rating indicates the soil has one or more properties that result in a high potential for fire damage. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration (Map 37 - High Potential Fire Damage Hazard Soils).

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and that is also available for these uses. The land could be currently used for cropland, pastureland, rangeland, forest land, or other land, but not urban or built up land or water areas.

Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. This land has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality crops and/or high yields of a specific crop when the lands are treated and managed according to acceptable farming methods.

The Farmland Protection Policy Act (FPPA) states that federal programs that contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses will be minimized and shall be administered in a manner that, as practicable, are compatible with state and local

government and private programs and policies to protect farmland. No Prime or Unique Farmlands are located in the decision area.

## 3.5 Water

The United States is divided and subdivided into successively smaller hydrologic units classified into four levels: regions, sub regions, accounting units, and cataloging units. Generally, a hydrologic unit is defined as a geographic area from where water naturally drains to a specific outlet. Hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions).

Water resources in the semi-arid environment of the planning area include both surface and subsurface resources. The availability, volume, and quality of water resources affect other resources and resource uses, including, but not limited to, wetlands and riparian areas, biological resources, livestock grazing, recreation, and public water supplies.

The BLM is responsible for managing surface lands and federal mineral estate in a manner that maintains or enhances water quality and quantity for other uses and complies with state and federal water quality standards. The BLM coordinates with state and other federal agencies to ensure compliance with required water resource management responsibilities.

### 3.5.1 Surface Water

The BiFO manages approximately 1,002 miles of perennial, intermittent, and ephemeral streams. Surface water runoff drains into the Yellowstone, Musselshell, Clarks Fork of the Yellowstone, Boulder, Stillwater, and Bighorn rivers (Table 3-10). Each major stream is characterized by a pattern of tributary branching streams ranging from ephemeral to perennial.

**Table 3-10 Annual Stream Flow Data**

| River/Stream | Site Code | Parameter Name | Period of Approved Daily-Mean (Water Year) | | |
|---|---|---|---|---|---|
| | | | From | To | Count |
| Big Horn at St. Xavier, MT | 06287000 | Discharge Cubic feet/sec | 1935 | 2008 | 27028 |
| Boulder near Big Timber, Mt | 06200000 | Discharge Cubic feet/sec | 1947 | 2008 | 22009 |
| Clarks Fork of the Yellowstone near Edgar, MT | 06208500 | Discharge Cubic feet/sec | 1921 | 2008 | 25631 |
| Clarks Fork of the Yellowstone near Belfry, MT | 06207500 | Discharge Cubic feet/sec | 1921 | 2008 | 31838 |
| Musselshell near Roundup, MT | 06126500 | Discharge Cubic feet/sec | 1946 | 2008 | 27768 |
| Musselshell near Musselshell, MT | 06127500 | Discharge Cubic feet/sec | 1928 | 2009 | 19642 |

| | | | | | |
|---|---|---|---|---|---|
| Stillwater near Absarokee, MT | 06205000 | Discharge Cubic feet/sec | 1910 | 2008 | 27135 |
| Yellowstone near Billings, MT | 06214500 | Discharge Cubic feet/sec | 1904 | 2008 | 29708 |

**Note:**
Source: USGS National Water Information System: http://waterdata.usgs.gov/mt/nwis/current?type=flow

A total maximum daily load (TMDL) is the allowable pollutant loading from all sources (point, non-point, and natural background) established at a level necessary to achieve compliance with applicable surface water quality standards. Streams in the planning area meet these standards except for those listed below (Table 3-11). A majority of impairment sources are outside of BLM administered lands and come from agriculture production and industrial sources.

### Table 3-11 Impaired Water Bodies

| Impaired Water Bodies by 4th Level Hydrologic Unit Code | | | | |
|---|---|---|---|---|
| **4th Hydrologic Unit Code** | **Stream Segment on BLM Land** | **Estimated Miles in BLM Land** | **Probable Impairment Type(s)[A]** | **Probable Impairment Source(s)[B]** |
| Stillwater River | Stillwater | 0.3 | 1, 4, 14 | 5, 9, 12, 14, 15 |
| | Bad Canyon | 4.5 | 12 | 2 |
| Clarks Fork of the Yellowstone | Clarks Fork | 0.4 | 1, 3, 4, 9, 10, 12, 13 | 3, 4, 12,13 |
| | Silvertip | 9.6 | 1, 2, 3, 5, 6, 7, 8, 9, 10, 11 | 1, 2, 6, 7, 8, 9, 10, 11 |
| | SF Bridger | 5.2 | 3, 16 | 8, 9, 12 |
| | Bear | 0.7 | 1, 2, 3, 4, 12 | 1, 2, 3, 4, 5 |
| | Blue Water | 1.2 | 3, 8, 12 | 2, 3 , 4, 16, 18 |
| | Cottonwood | .75 | 2, 5, 8 | 1, 2, 8, 9, 18 |
| Upper Yellowstone | Yellowstone | 4.3 | 1, 3, 8 | 3, 9, 10, 16, 17, |
| | Boulder | 0.14 | 1,2,4, | 2,3,12 |
| | Big Lake | .25 | 8 | 18 |
| Big Horn Lake | Crooked | 3.2 | 13 | 18 |
| Middle Musselshell | Musselshell | 0.9 | 2, 10, 13 | 4, 6, 13, 18 |
| | North Willow | 3.5 | 1, 3, 4, 6, 15, | 9, 11, 12 |
| Total | | 34.94 | | |

**Note:**
[A] Cause: 1 = Nutrients, 2 = Alteration of Streamside Vegetation, 3 = Sediment, 4 = Metals, 5 = Oxygen Depletion, 6 = Specific Conductance, 7 = Turbidity, 8 = Total Dissolved Solids, 9 = Temperature, 10 = Flow Alterations, 11 = Toxic Organics, 12 = Harmful Algae, 13 = Habitat Alterations, 14 = Cyanide, 15 = Sulfates, 16 = Arsenic

[B] Source: 1 = Loss of Riparian Habitat, 2 = Rangeland Grazing; 3 = Irrigated Crop Production; 4 = Hydrologic Modification, 5 = Abandoned Mine Lands, 6 = Channelization, 7 = Impoundments, 8 = Riparian Grazing, 9 = Natural, 10 = Industrial Permitted, 11 = Spills, 12 = Unknown, 13 = Streambank modification, 14 = Hard Rock Mining, 15 = Post Fire Runoff, 16 = Feedlots, 17 = Municipal Discharge, 18 = Agriculture

Source: 2010 Montana 303(d)/ 305(b) Intergraded Report

Wetlands and riparian areas can play a critical role in reducing nonpoint source pollution by intercepting surface runoff, subsurface flow, and certain ground water flows. Their role in water quality improvement includes processing, removing, transforming, and storing such pollutants as sediment, nitrogen, phosphorus, and certain heavy metals. Research also shows that riparian areas control the release of herbicides into surface waters (EPA 2005a). Thus, wetlands and riparian areas buffer receiving water from the effects of pollutants and/or prevent the entry of pollutants into receiving waters. It is important to consider that degradation of wetlands and riparian areas can inhibit their ability to treat NPS pollution, and degraded wetlands and riparian areas can also become sources of NPS pollution. Current wetland and riparian area conditions and management are described in Riparian Areas and Wetlands Section.

### 3.5.2 Ground Water

Ground water is a valuable resource in Montana and is vulnerable to the affects of nonpoint source (NPS) pollution. Depending on the setting, ground water can be intricately linked with surface water. Ground water is the primary source of drinking water for Montanans who live outside city boundaries, as well as those who are on public water systems in smaller towns. In many cases, ground water is also the primary source of water in streams and rivers during the fall and winter 'baseflow' period and may be the primary source of lake water. Additionally, ground water is vital to wetlands and riparian areas.

The planning area is underlain by sandstone and limestone that provide large quantities of water to wells and springs. In the north, wells drilled to the Kootenai Formation yield good volumes and quality water. The Madison Limestone in the Pryor Mountains yields good quantities of water that is of quality suitable for domestic and agricultural use. In the Bull Mountains, ground water apparently occurs in perched aquifers and springs or seeps and is located near outcrops of the Mammoth-Rehder coal bed. Water is not as dependable in the Bull Mountains as elsewhere in the region. Water in springs is good quality with calcium, magnesium, and bicarbonate the principal ions. Deeper aquifers are present at depths that vary from 20 feet to several hundred feet. Deeper aquifers have water of lower quality with sodium and sulfate ions present.

No current, comprehensive, quantification, nor quality measurements have been made on ground waters occurring on BLM administered lands.

Best management practices, state, and federal guidance concentrate on protecting water quality. A clear establishment of the importance of riparian health is critical in understanding the connectivity between riparian vegetation, water quality and quantity and aquatic resources. The following guidance sets the foundation for BLM management of aquatic resources through sound habitat and water quality management.

## 3.6 Vegetation

There are numerous vegetation cover types in the BiFO planning area. These vegetation types are an expression of the wide range of climatic and soil conditions found throughout the

planning area. The Landscape Fire and Resource Management Planning Tools Project (commonly referred to as LANDFIRE) was used to delineate rangelands and identify them as existing vegetation types (EVTs) (LANDFIRE 2006). Vegetation cover types and associated plant communities were defined and analyzed using the Northwest Regional Gap Analysis Project (NWReGAP), information provided by BLM resource specialists and other references, as noted (NWReGAP 2001). Nomenclature herein is consistent with the Nature Conservancy's ecological classification database system known as NatureServe (NatureServe 2008).

Vegetation cover types in the decision area consist primarily of shrubland and rangeland communities and cover approximately 372,001 acres (87 percent) of the total BLM managed surface acreage. Forest/woodlands and riparian/wetland vegetation cover types, comprise approximately 47,035 acres (11 percent) and are a biologically diverse and important resource in the decision area. Urban and agricultural cover types comprise the remaining 8,552 acres (2 percent) in the decision area. Table 3-12summarizes vegetation cover types, spatial extent of each vegetation type, and a description of each associated plant community in the planning area. Map 9 (Vegetative Map) illustrates each vegetation cover type in the planning area.

**Table 3-12 Vegetation Cover Types in the Planning Area**

| Vegetation Cover Type | Total Cover (Acres/Percent) | Characteristic Species |
|---|---|---|
| Shrubland | 243,656 (56.1 %) | Wyoming big sagebrush, Basin big sagebrush, black sage, saltbush and greasewood species |
| Rangelands | 142,556 acres (32.8 %) | Wheatgrass, grama, and needle-and thread species |
| Forest/Woodlands | 32,100 acres (7.4 %) | Ponderosa pine, lodgepole pine, limber pine, Douglas-fir, subalpine fir, Engelmann spruce, quaking aspen, Rocky Mountain juniper, and cottonwood species |
| Riparian/Wetlands | 14,966 acres (3.5 %) | Cottonwood species, quaking aspen, green ash, willow, red osier dogwood with understory of woody plant and grass/forbs |
| Urban and Agricultural Lands | 876 acres (0.2 %) | Agricultural species including hay, alfalfa, corn and introduced herbaceous species including bluegrass and ornamental grass and tree species |
| **TOTAL** | **427,619 acres (100.0 %)** | |

Regardless of cover type, the BLM uses the *Standards for Rangeland Health* to manage public lands. The Billings Field Office uses five standards to assess rangeland health. These standards are: Standard 1 - Uplands, Standard 2 - Riparian and Wetlands, Standard 3 – Water Quality, Standard 4 – Air Quality, Standard 5 – Habitat. Standards 1, 2, and 5 directly relate to vegetation, while Standards 3, 4, and potentially 5 are influenced by vegetation. Table 3-16 shows the number of allotments/acres within the decision area where Standards are or are not being met and if appropriate action has been taken to make progress towards meeting Standards.

## 3.6.1 Forest and Woodlands

Forest and woodland areas were delineated utilizing LANDFIRE. Twenty-two separate forest and woodland habitat communities were mapped to identify existing vegetation types (EVTs) in the planning area. Forests/woodlands comprise approximately 32,100 acres (7.5 percent) of the decision area. Cover types are characterized as a composite of evergreen conifer and deciduous forest types that occur throughout Montana. Species dominance varies with altitude, latitude, slope, aspect, topography, soil characteristics, and climatic regime. The predominant tree species include ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), limber pine (*Pinus flexilis*), Douglas-fir (*Pseudotsuga menziesii*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), quaking aspen (*Populus tremuloides*), and Eastern cottonwood (*Populus deltoides*). Rocky Mountain juniper (*Juniperus scopulorum*) is the predominant woodland species found throughout the decision area. Table 3-13 details each forest and woodland ecological system community, the spatial extent of each type, and a description of each associated plant community in the decision area.

**Table 3-13 Forest/Woodland Vegetation Cover Types**

| Forest and Woodland Ecological System and Community Name | Total Vegetation Cover in Decision Area (Percent) | Forest/ Woodland Cover in Decision Area (Percent) | Total Acreage | Predominant Woody Characteristic Species |
|---|---|---|---|---|
| Northwestern Great Plains-Black Hills Ponderosa Pine Woodland and Savanna & Associated Ponderosa Pine Communities | 3% | 42% | 13,400 | Ponderosa pine and Rocky Mountain juniper |
| Middle Rocky Mountain Montane Douglas-Fir Forest and Woodland/*Pseudotsuga menziesii* Forest Alliance | 2% | 24% | 7,800 | Douglas-fir, lodgepole pine, subalpine fir |
| Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest | 1% | 14% | 4,600 | Lodgepole pine, Douglas-fir, Engelmann spruce, and subalpine fir |
| Rocky Mountain Foothill Limber Pine-Juniper Woodland | 1% | 12% | 3,800 | Limber pine and Rocky Mountain juniper |
| Other Forest and Woodland Ecological Systems and | 0.6% | 8% | 2,500 | Quaking aspen, Rocky Mountain juniper, one- |

| Forest and Woodland Ecological System and Community Name | Total Vegetation Cover in Decision Area (Percent) | Forest/ Woodland Cover in Decision Area (Percent) | Total Acreage | Predominant Woody Characteristic Species |
|---|---|---|---|---|
| Communities | | | | seed juniper (***Juniperus monosperma)***, **lodgepole pine, Engelmann spruce, and cottonwood species.** |
| **TOTAL** | **7.6%** | **100%** | **32,100** | ***N/A*** |

**Note:**
Source: NatureServe 2008, LANDFIRE National Existing Vegetation Type layer 2006.

Quaking aspen communities or "stands" comprise a small percentage of the overall vegetation community structure in the decision area. They are often found as small groves in mountain coniferous forest communities. These communities usually support a dense understory of mixed grasses and forbs with an occasional shrub component. Quaking aspen communities are most abundant along the Beartooth and Absaroka mountains and appear to be mature stands. These stands vigorously resprout following fire and are often an early seral stage species in forested communities. Many show evidence of invasion by shade tolerant conifers, which may eventually replace the quaking aspen component; however, conifer removal would promote aspen regeneration (Howard 1996).

Douglas-fir communities are found on north slopes in the Pryor Mountains and throughout the Beartooth and Absaroka mountain areas. This forest type is generally found in steep north or northeast facing drainages at middle elevations in the planning area. Soils are usually shallow, and the slopes are colder and moister than the surrounding habitat. Douglas-fir is found intermixed with limber pine, ponderosa pine, lodgepole pine, and quaking aspen. Numerous acres of Douglas-fir throughout the planning area are reported to be infested with western spruce budworm. Most infestation areas are in older stands, decadent stands, or both (Steinberg 2002).

Limber pine communities occupy warm and dry sites at low and middle elevations, primarily in the Pryor, Beartooth, and Absaroka mountain areas. Sparse pockets intermingled with shrublands are located throughout the entire southern portion of the planning area. Limber pine is often found intermingled with other pine species or shrubs, most commonly Douglas-fir and lodgepole pine at the higher elevations, and juniper and/or sagebrush at the lower elevations (Johnson 2001).

Lodgepole pine communities in the planning area have three different ecological roles: (1) as a seral species to more shade tolerant tree species; (2) as a relatively stable co-dominant with one or more other species (persistent); and (3) as the only tree layer dominant (persistent). Found primarily in the Absaroka, Beartooth, and Pryor mountain areas, lodgepole pine grows with nearly all other mountain conifers in its range and often forms dense, nearly pure stands. Pure lodgepole pine stands frequently result after repeated fires and where there is no seed source for

other species. In pure stands of lodgepole pine, there is seldom an understory of reproduction, though in low density stands there may be younger trees in the understory.

Mixed stands of lodgepole pine and other species are also common; especially stands of lodgepole pine, Engelmann spruce, and subalpine fir at higher elevations, and stands of lodgepole pine and Douglas-fir and/or limber pine at mid to lower elevations. In mixed stands, the overstory may be either pure lodgepole pine or may contain a mix of the above-mentioned conifer species, with the more shade tolerant species in the understory. Lodgepole pine invades dry meadows and sites previously dominated by big sagebrush. However, lodgepole pine is primarily an aggressive pioneer on disturbed sites, with its occurrence due largely to fire. This is visible in the various successional stages of homogeneous stands throughout the Beartooth and Pryor mountain areas. In fire generated stands of similar age, trees become susceptible to mountain pine beetle attack at approximately the same time, resulting in large scale infestations. Where lodgepole pine is persistent, mountain pine beetle infests and kills most large lodgepole pine trees. The openings created by beetle attacked areas are seeded by lodgepole pine, and the cycle is repeated as other trees reach the size conducive to beetle populations. Mountain pine beetle and other non-fire disturbances thin the larger size classes. When combined with patchy fire spread, this complex disturbance regime results in multi-storied, mosaic stands, consisting of different ages and size classes. The overall effect is chronic infestations of mountain pine beetle due to the constant food source (Anderson 2003).

Subalpine fir communities exist at the higher elevations in wetter precipitation zones, generally occupying cold and higher mountain forests in the Absaroka, Beartooth, and Pryor mountain areas. Subalpine fir is a mid to upper elevation mountain conifer. It is generally found where there is a short growing season caused by cold winters, cool summers, frequent summer frosts, and heavy snowpack. It forms extensive forests between warm and dry lower elevation forests of Douglas-fir, lodgepole pine, or Engelmann spruce, and higher elevation alpine tundra. At lower elevations, subalpine fir is often restricted to stream bottoms, ravines, frosty basins, or northern exposures. In the Pryor Mountains, subalpine fir is commonly found intermingled with limber pine at mid to lower elevations. It increasingly occupies westerly and easterly aspects with increasing elevation and may occupy all aspects at upper timberline. Most subalpine fir stands throughout the planning area are in some stage of fir beetle and spruce budworm infestation. Extended drought and decadent stands contribute to the insect proliferation. Numerous insects attack subalpine fir; the most destructive seems to be the western spruce budworm. Subalpine fir is one of the western spruce budworm's most common hosts. This pest generally attacks low and middle elevation subalpine fir forests and is largely absent from high elevation forests. Other insect pests include the Douglas-fir tussock moth, western black-headed budworm, and fir engraver beetle (Uchytil 1991).

The interior ponderosa pine/bunchgrass community type is the most common vegetative community throughout the planning area. It is characterized by open grasslands interspersed with widely spaced trees. Under pristine conditions, the tree canopy usually covers no more than 25 percent of the forest floor. Stand structure in the planning area resembles open savanna at lower elevations and dense forest at higher elevations. In the central part of the planning area, the interior ponderosa pine type merges into plains grassland at lower elevations and limber pine at higher elevations. Limber pine, Douglas-fir, and Rocky Mountain juniper are

common overstory associates. Interior ponderosa pine is one of the only forest trees in southeastern Montana and forms several diverse habitats. On dry sites, it supports an understory of plains grassland species. Understories are typically dense on wetter sites and include species characteristic of Pacific ponderosa pine forests to the west (Arno 1979).

Cottonwood species communities are found in wetter drainage bottoms with the largest concentrations along the Yellowstone, Clarks Fork of the Yellowstone, Boulder, Bighorn, and Musselshell rivers. Many stands are mature or over-mature and in decline. Regeneration is poor and exacerbated by domestic animals, encroachment of noxious and undesirable species, and wildlife (Taylor 2001).

Long-term fire suppression since the early 1900s has allowed forests and woodlands to become overstocked with dense fuels, such that wildfires often are more intense and severe than under historic fire regimes. In some cases, this results in widespread stand replacement and could result in vegetation type conversion, severe erosion, or the need for extensive restoration efforts, including tree planting. Juniper expansion into coniferous forests and quaking aspen stands affects the growth, reproduction, and overall health of these forests. Bartos and Campbell (1998) have estimated that 60% to 90% of quaking aspen stands in the western United States have been taken over by other species due to fire exclusion since European settlement.

Plains island forests – refugia of trees and tree-dependent species isolated in a grassland matrix are at significant risk from climate changes because they are ecotone systems (borderline between grassland and forest ecosystems) and therefore sensitive to relatively small changes in environmental conditions. In addition, because island forests are relatively small ecosystems, they may exhibit reduced genetic diversity and greater vulnerability to catastrophic disturbance such as wildfire, pathogen attack, or severe drought (Henderson et al. 2002).

Silvicultural treatments including harvest, thinning, other mechanical treatments, and prescribed fire would reduce conifer stocking levels and create openings of various sizes to stimulate the growth and development of forests and woodlands. Increasing growing space (e.g., sunlight, water, nutrients, etc.) is expected to maintain or enhance vegetative vigor; structure; density; and species composition, pattern, and distribution; which would promote forest resiliency and productivity and reduce the occurrence of catastrophic wildfire and forest insect and disease outbreaks.

## 3.6.2 Rangelands and Shrublands

Rangelands, the second most abundant vegetation cover type, covers approximately 142,556 acres (32.8 percent) of the decision area. Rangeland communities range from subalpine meadows in annual average precipitation zones of 20 or more inches on top of the Pryor Mountains to Red Desert saltbush communities receiving less than nine inches as observed in southern Carbon County. Vegetation composition and structure varies between and within types due to local factors including soils, aspect, precipitation, elevation, slope, and ecological condition. Fifteen cover types are identified in the decision area. Of the fifteen cover types

identified approximately 96% of the acreage occurs within five cover types. These cover types are listed in Table 3-14.

**Table 3-14 Rangeland Cover Types**

| Rangeland Cover Types | | | | |
|---|---|---|---|---|
| **Rangeland Ecological System and Community Name** | **Total vegetation cover in Decision Area (Percent)** | **Rangeland cover in Decision Area (Percent)** | **Total Acreage** | **Predominant Characteristic Species** |
| Northwestern Great Plains Mixedgrass Prairie | 25.4 | 77.4% | 110347 | Green needlegrass, western wheatgrass, needle-and-thread, prairie junegrass, threadleaf sedge |
| [1]Introduced Upland Vegetation-Annual and Biennial Forbland | 2.8% | 8.7% | 12,454 | Crested Wheatgrass, alfalfa, sweet clover |
| Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland | 1.14% | 4.2 | 5,954 | Bluebunch wheatgrass, Idaho Fescue, rough Fescue |
| Western Great Plains Sand Prairie | 1.1 | 3.2% | 4,590 | Blue grama, needle-and-thread, little bluestem |
| Inter-Mountain Basins Semi-Desert Grassland | 0.8% | 2.67% | 3,815 | Needle-and- thread, bluebunch wheatgrass, Sandberg bluegrass |
| Other | 1.2% | 3.78% | 5,396 | N/A |
| Total | 32.44% | 99.95% | 142,556 | N/A |

**Note:**
Source: NatureServe 2008, LANDFIRE National Existing Vegetation Type Layer 2006.

1. Ecological System and Community Name derived from Landfire Existing Vegetation Layer 2006. These Vegetation types are not referenced in NatureServe 2008. Predominant characteristic species were derived from Ecological Site Descriptions, and local knowledge.

The Northwestern Great Plains Mixedgrass Prairie occurs in all counties within the decision area. This system occurs on 110,347 acres (25.4 percent) of the decision area and is the most abundant rangeland system in the decision area. This ecological system is found on both glaciated and non-glaciated substrate. This system occurs on fine and medium textured soils. This system is similar to the Western Great Plains Sand Prairie which occurs on courser textured soils. Common vegetation found in this system in Montana includes: western wheatgrass (*Pascopyrum smithii),* green needlegrass (*Nassella viridula),* needle-and-thread (*Hesperostipa comata),* prairie junegrass (*Koeleria macrantha),* and threadleaf sedge (*Carex filifolia).* Communities within this system adjacent to the Northern Rocky Mountain Lower Montane Foothills Valley Grassland system may begin to pick up Idaho Fescue (*Festuca idahoensis).*

The Introduced Upland Vegetation-Annual and Biennial Forbland system is common in Carbon, Musselshell, and Yellowstone Counties. This system occurs on approximately 12,500 acres or (2.8 percent) of the decision area. These systems typically occur on lands that have been degraded due to past management practices, such as grazing or agriculture. Common

species on these lands include crested wheatgrass (*Agropyron cristatum*), dryland alfalfa (*Medicago ssp*.), sweet clover (*Melilotus ssp.*), and milkvetch species (*Astragalus ssp.).*

The Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland system is located in Carbon, Stillwater, Sweet Grass, Golden Valley, and Wheatland Counties. This system occurs on approximately 6,000 acres or (1.14 percent) of the decision area. This system is found at foothill elevations of the Beartooth, Absaroka, Pryor, Crazy, Little Belt, and Big Snowy mountain ranges. This system often is adjacent to the Northwestern Great Plains Mixedgrass Prairie System which typically occurs at lower elevations. This system is commonly found on relatively deep, fine textured soils, often with course fragments. Common vegetation within this system includes: bluebunch wheatgrass (*Pseudoroegneria spicata),* Idaho fescue, rough fescue (*Festuca campestris),* and needle-and-thread.

The Western Great Plains Sand Prairie system is similar to the Northwestern Great Plains Mixed Grass Prairie, which can surround the Western Great Plains Sand Prairie system. Soils separate the two systems, as the Western Great Plains Sand prairie system occurs on courser soils with a sand influence, while the Northwestern Great Plains Mixed Grass Prairie occurs on fine to medium textured soils. Weathered in place sandstone typically provides the substrate needed for this system to occur in Montana. This system occurs on approximately 4,500 acres or (1.1 percent) of the decision area. In the decision area, this system is occurs in eastern Carbon and southern and south eastern Yellowstone Counties. In these counties the common species found within this system include: prairie sandreed (*Calamovilfa longifolia*), little bluestem (*Schizachyrium scoparium*), and needle-and thread.
The Inter-Mountain Basins Semi-Desert Grassland within the decision area is found in the northern portions of the bighorn basin which occurs in southern Carbon County. This system occurs on approximately 3,800 acres or (0.8 percent) of the decision area. This system is found on a variety of landforms in the area and may constitute a mosaic within shrubland systems. In Montana, this system is dominated by bluebunch wheatgrass and Sandberg bluegrass (*Poa secunda*). Other common herbaceous species in this system include indian ricegrass (*Achnatherum hymenoides),* blue grama (*Bouteloua gracilis),* and needle-and-thread.

Shrublands, the most abundant cover type in the decision area, compose approximately 243,653 acres within the decision area. This represents approximately 56.1 percent of the area. Of the 19 cover types identified, approximately 97% of the decision area occurs within five cover types. These cover types are listed in Table 3-15.

**Table 3-15 Shrubland Cover Types**

| Shrubland Cover Types | | | | |
|---|---|---|---|---|
| **Shrubland Ecological System and Community Name** | **Total vegetation cover in Decision Area (Percent)** | **Rangeland cover in Decision Area (Percent)** | **Total Acreage** | **Predominant Characteristic Species** |
| Inter-Mountain Basins Big Sagebrush Shrubland | 32.8% | 58.5% | 142,549 | Wyoming big sagebrush, rabbit brush, saltbush, needle-and-thread, bluebunch wheatgrass |
| Inter-Mountain Basins Big Sagebrush Steppe | 15% | 26.6% | 64,892 | Wyoming big sagebrush, western wheatgrass, indian ricegrass, needle-and-thread |
| Inter-Mountain Basins Montane Sagebrush Steppe | 3.96% | 7% | 17,204 | Mountain big sagebrush, snowberry, timber oatgrass, Idaho fescue, muttongrass, Sandberg bluegrass, bluebunch wheatgrass |
| Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland | 1.3% | 2.6% | 5,757 | Curl leaf mountain mahogany, mountain big sagebrush, Idaho fescue, bluebunch wheatgrass |
| Wyoming Basins Dwarf Sagebrush Shrubland and Steppe | 1.15% | 2% | 5,012 | Birdsfoot, black, dwarf, and Wyoming sage brush species, blue grama, Idaho fescue, bluebunch wheatgrass |
| Other | 1.89% | 3.3% | 8,239 | N/A |
| Total | 56.1% | 100% | 243,653 | |

**Note:**
Source: NatureServe 2008, LANDFIRE National Existing Vegetation Type Layer 2006.

The Inter-Mountain Basins Big Sagebrush shrubland is the most dominant cover type in the decision area. This cover type is found on approximately 142,500 acres (32.8 percent) of the decision area. This system is found throughout most of Carbon County, and eastern Musselshell and Yellowstone Counties. This system is typically found in broad basins between mountain ranges, plains, and foothills. Soils are typically deep and well drained. Dominant shrub species in this system includes Wyoming big sagebrush (*Artemisia tridentata ssp. Wyomingensis),* rubber rabbitbrush *(Ericameria nauseosa),* and green rabbitbrush *(Chrysothamnus viscidiflorus).* Common understory vegetation includes: indian ricegrass, blue grama, Sandberg bluegrass, and bluebunch wheatgrass.

The Inter-Mountain basins Big Sagebrush Steppe system occurs on approximately 65,000 acres (15 percent) of the decisions areas. This system occurs in Carbon, Musselshell and Yellowstone Counties. This system is similar to the Inter-Mountain Basins Big Sagebrush Shrubland system; however shrub diversity is typically lower in the steppe system. This system is typically dominated by Wyoming big sagebrush, with western wheatgrass, indian ricegrass, needle-and-thread, green needlegrass, and bluebunch wheatgrass common herbaceous understory vegetation.

The Inter-Mountain Basins Montane Sagebrush Steppe occurs on approximately 17,000 acres (4 percent) of the decision area. This system is found in Carbon, Golden Valley, Stillwater, Sweet Grass, and Wheatland Counties. This system occurs at foothill elevations of the

Absaroka, Beartooth, Crazy, Little Belt, Pryor, and Big Snowy Mountains. This system is found on mesic sites with gentle topography and fine soils. The dominant shrub in this system is mountain big sagebrush (*Artemisia tridentata ssp. Vaseyana)*; other shrub species include snowberry (*Symphoricarpos spp.)* rubber rabbitbrush, green rabbitbrush, and Wyoming big sagebrush. Common understory vegetation includes timber oatgrass (*Danthonia intermedia*), Idaho fescue, muttongrass (*Poa fendleriana*), Sandberg bluegrass, and bluebunch wheatgrass. The Inter-Mountain Basins Curl-Leaf Mountain Mahogany Woodland and Shrubland System occurs on approximately 5,800 acres or (1.3 percent) of the decision area. This system is found predominantly in Carbon County in the foothills of the Pryor Mountains. This system is typically found in small stands on ridges and steep rimrock slopes. This system is dominated by curl leaf mountain mahogany (*Cercocarpus ledifolius*) and mountain big sagebrush.

Understory vegetation is typically sparse and includes bluebunch wheatgrass and Idaho fescue. The Wyoming Basins Dwarf Sagebrush Shrubland and Steppe system occurs on approximately 5,000 acres (1.1 percent) of the decision area. This system is found predominantly in southern Carbon County. This system is occurs on gently rolling hills to long gentle slopes. Sites are typically very windy with shallow rocky soils. Short shrubs distinguish this system and contribute at least 66% of the canopy cover. Common shrub species include birdsfoot sagebrush (*Artemisia tripartita),* black sagebrush (*Artemisia nova),* and wind dwarfed Wyoming big sagebrush.

Ecological site descriptions (ESDs) are available for most of the locations within the decision area. These ESDs describe the expected soils and vegetation characteristics that should be found on individual sites, as well as the transitional pathways a community may experience due to disturbance and management practices. Information contained in the ESDs has been used extensively in local planning efforts, including Allotment Management Plans.

Rangeland communities range from subalpine meadows in annual average precipitation zones of 20 or more inches on top of the Pryor Mountains to Red Desert saltbush communities receiving less than nine inches, as observed in southern Carbon County. Vegetation composition and structure varies between and within types due to local factors including soils, aspect, precipitation, elevation, slope, and ecological condition. Loehman (2009) found that "Climate changes in the Prairie Potholes and Grasslands bioregion include increased seasonal, annual, minimum, and maximum temperature and changing precipitation patterns."

Vegetation can be grouped into three broad geographic zones in the decision area: Eastern Sedimentary Plains, Western Sedimentary Plains, and Foothills and Mountains (Map 9 – Vegetative Map). The Eastern Sedimentary Plains zone encompasses the area between the Musselshell and Yellowstone rivers and east of U.S. Highway 87. This area includes approximately 110,000 acres of public land and is in the 10 to14 inch precipitation zone. This is primarily a sagebrush/grassland vegetative type consisting of big sagebrush, bunch grasses, and western wheatgrass. A ponderosa pine/grassland type is also included in this zone.

The Western Sedimentary Plains zone includes a variety of vegetative types. This zone takes in essentially all of northern Musselshell, Golden Valley, Wheatland, and western Yellowstone counties, those portions of Stillwater and Sweet Grass counties north of the Yellowstone River,

and the Clarks Fork valley and triangle area in Carbon County. Precipitation ranges from five to 20 inches. Collectively, this zone encompasses approximately 260,000 acres of public land. Vegetation consists primarily of sagebrush/grassland and grassland types, though it does include the red desert/saltbush type on the Wyoming border in southern Carbon County, as well as some areas of ponderosa pine/grassland type vegetation.

The remaining 55,000 acres of public land are located in the Foothills and Mountain zone. This zone includes the Pryor Mountains, the north face of the Beartooth Mountains, and the south face of the Big Snowy Mountains.

The Natural Resource Conservation Service (NRCS) developed site-specific "Technical Range Site Guides" that apply to each of the broad regions. The guides describe the expected soil and vegetative characteristics that should be found on individual range sites and the expected departure in condition with respect to varying degrees of management. Information contained in the guides has been used extensively in local planning efforts, including Allotment Management Plans.

In August 1997, the Montana/Dakotas *Standards for Rangeland Health and Guidelines for Livestock Grazing* (S&Gs) became effective for all BLM lands in Montana and the Dakotas. Standards describe the conditions needed to sustain public land health and apply to all uses of public lands. Rangeland health is the minimum ecological standard, independent of how a rangeland is used or managed. If rangeland health is protected, a variety of uses could be appropriate for any particular rangeland. Standards apply to rangeland health and not to the important byproducts of healthy rangelands such as more fish, higher livestock weaning weights, regional social and cultural values, increased timber production, economic viability of livestock operations, or higher numbers of game animals. The sustainability of the rangeland health processes produces these social values and commodities.

The S&Gs are intended to maintain healthy and productive public rangelands essential to support long term grazing and stable communities that rely on the land. Standards are measurable levels of resource quality, condition, or function upon which management decisions are based. It is the BLM's policy to achieve rangeland health standards through management of existing uses when feasible. Standards provide the technical and scientific basis for measuring progress towards healthy, productive rangelands. Standards are not expected to recreate theoretical "pristine" rangeland conditions that may have existed before livestock grazing began. It is assumed most areas will be grazed unless there is no way to graze them and still achieve standards or that the area is dedicated to other uses such as campgrounds, mining, and cultural/historical sites, such as Pompeys Pillar. Refer to Appendix I – Land Health Standards outlining the standards conformance review determinations for each allotment in the decision area.

**Table 3-16 Rangeland Conditions**

| Rangelands meeting all Standards | | Rangelands making significant progress toward meeting Standards | | Rangelands not meeting Standards, but changes have been made | | Rangelands not meeting Standards and no changes have been made | | Rangelands not meeting Standards due to causes other than livestock grazing | | No Assessment Completed | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 309 Allotments | 309,658 Acres* | 34 Allotments | 41,153 Acres* | 8 Allotments | 3,675 Acres | 1 Allotment | 80 Acres* | 2 Allotments | 80 Acres* | 16 Allotments | 6,835 Acres* |

**Note:**
Source: 2012 year end rangeland monitoring report.
* Due to acreage accounting differences in the PMWHR, the administrative pastures are double counted as an allotment and as part of the HMA.

At a minimum, state or regional standards must address the following: watershed function; nutrient cycling and energy flow; water quality; habitat for endangered, threatened, proposed, Candidate 1 or 2 or special status species; and habitat quality for native plant and animal populations and communities.

## 3.6.3 Riparian and Wetlands

Riparian/wetlands were analyzed through the LANDFIRE database, delineating this community in some 14,966 acres (3.5 percent) of the decision area. The riparian zone is a minor community in the decision area; however its importance to water quality and wildlife habitat is widely recognized. Riparian zones are defined as "a form of wetland transition between permanently saturated wetlands and upland areas." These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water. Lands along, adjacent to, or contiguous with perennially flowing rivers and streams, wetlands, glacial potholes, and shores of lakes and reservoirs with stable water levels, are typical riparian areas. Ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil are excluded (BLM Manual 1737).

Wetlands are defined as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, under normal circumstances, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands include marshes, shallows, swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas (BLM Manual 1737). These areas provide a wide range of functions critical to many different wildlife species, water quality, scenery, and recreation (Brimson 2001).

Jurisdictional wetlands, those regulated by the US Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA), must exhibit all three of the following characteristics: hydrology, hydrophytic vegetation, and hydric soils (USACE 1987). It is important to note that some areas function as wetlands ecologically, but exhibit only one or two of the three characteristics. Consequently, they do not currently qualify as USACE jurisdictional wetlands, and activities there are not regulated under the Section 404 program. These wetlands still perform valuable functions.

Riparian diversity in the decision area is extensive, ranging from subalpine to prairie and desert community types. Herbaceous and woody species common to riparian areas vary widely from

site to site. Riparian communities along the larger perennial drainages are often dominated by cottonwood (Populus spp.) and willow (*Salix* spp.) with occasional stands of box elder (*Acer negundo*) and green ash (*Fraxinus pennsylvanica*). In mountain streams, riparian communities are dominated by willow, water birch (*Betula occidentalis*), red osier dogwood (*Cornus sericea*), cottonwood, and conifers such as Douglas-fir and lodgepole pine. The understory often consists of woody plants such as buffaloberry (*Shepherdia* spp.), snowberry (*Symphoricarpos* spp.), Woods' rose (*Rosa woodsii*), and grasses and forbs.

In the southern portion of the decision area, there is a small desert region that receives an average of five inches of precipitation a year. However, several springs and intermittent streams in this area support a lush riparian zone. These narrow bands of lush vegetation and free water are invaluable to wildlife in the area, and this elevates the value of the riparian area.

Along many of the prairie and desert streams, infestation of noxious plants such as Russian olive and salt cedar is prevalent. Control of these invasive species is difficult since riparian segments on public land are limited and fragmented. To effectively remove Russian olive (*Elaeagnus angustifolia*) and salt cedar (*Tamarix ramosissima*) from a riparian zone, it would be critical to manage/treat all adjacent areas, upstream and down, to control seed dispersal.

The ongoing drought, which started in 1997 (NOAA, NCDC), has resulted in new ephemeral streams that do not support riparian communities. Range and riparian surveys and observations have recorded perennial wetlands in pre drought conditions; however, the areas have since become dry washes that do not support riparian communities or diversity has diminished to a single hardy obligate species.

Climate factors can have a significant effect on the health and vigor of many wetlands.

> *"Because wetlands exist in the transition zone between aquatic and terrestrial environments, they are vulnerable to changes in the surface and ground water hydrology. These hydrologic shifts may push wetland species beyond their limits of adaption and tolerance. Wetlands that depend upon precipitation as their primary water source are the most vulnerable to climate variation and change."* (Burkett and Kusler 2000).

Information on the condition of riparian areas and wetlands is available from proper functioning condition (PFC) assessments conducted from 1989 to the present (available at the BiFO). All riparian habitats are dependent on a balanced combination of physical (stream bank, channel, and soil characteristics), hydrologic (regular occurrence of surface water), and vegetation (hydrophytic communities) components. When any of these three components (soil, water, and vegetation) are negatively affected, the functional capacity of a riparian habitat may be degraded. A PFC assessment evaluates these components then rates the riparian area as either: PFC; Functioning at Risk, Upward Trend (FAR-U); Functioning at Risk, Trend Not Apparent (FAR-NA); Functioning at Risk, Downward Trend (FAR-D); and Non-Functional (NF).

Since the purpose of the PFC assessment is to evaluate most of the indicators for land health Standard 2, the functional rating (PFC, FAR, NF) for each riparian area determines whether the

standard is being achieved. A PFC rating means most or all the indicators in the system's potential have been met, and therefore Standard 2 has been achieved. A FAR-U rating generally means that several indicators have not been met but that significant progress is being made toward achieving them. A FAR-D or FAR-NA rating means several indicators have not been met and generally, Standard 2 is not achieved. Similarly, an NF rating means critical indicators have not been met and, consequently, Standard 2 is not achieved.

For swift flowing (lotic) systems, a riparian/wetland area is considered to be in PFC when adequate vegetation, landform, or large woody debris is present to accomplish the following:

- Dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality
- Filter sediment, capture bed load, and aid floodplain development
- Improve floodwater retention and groundwater recharge
- Develop root masses that stabilize stream banks against cutting action
- Develop diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses
- Support greater biodiversity (Technical Reference BLM-RS-ST-99-001+1737)

For still or slow flowing (lentic) systems, riparian wetland areas are functioning properly when adequate vegetation, landform, or debris is present to accomplish the following:

- Dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality
- Filter sediment and aid floodplain development
- Improve floodwater retention and groundwater recharge
- Develop root masses that stabilize islands and shoreline features against cutting action
- Restrict water percolation
- Develop diverse ponding characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses
- Support greater biodiversity (Technical Reference BLM-RS-ST-99-001-1737)

Each riparian/wetland area is judged against its capability and potential (Technical Reference BLM-RS-ST-98-001-1737).

The decision area contains limited lentic riparian habitat. The extended drought, coupled with soil and geographic characteristics, has created minimal ponding features, and many reservoir attempts in the decision area have failed. Lentic areas that do exist are closed systems with high alkaline constituent, limiting riparian obligates to a few species that can adapt to such conditions. These communities offer little beneficial riparian wildlife habitat. Due to the limited number of lentic areas and loss of climatic moisture from the drought, many of these areas have not been inventoried. Additional inventories may provide additional information about the lentic status in the decision area.

The most recent results of the PFC assessments are identified in Table 3-17 and Table 3-18, and illustrated in Map 10 (Riparian Properly Functioning Condition Surveys).

It is difficult to directly correlate changes in lotic and lentic riparian condition over the years. As streams and wetlands are inventoried and assessed, stream miles and wetland acres are sometimes added or removed from the inventory. Using geographic positioning system (GPS) technology makes accurate measurements easier, allowing for a higher standard of data and repeatability.

**Table 3-17 2010 Functional Condition of Lotic Systems by County (miles)**

| County | Proper Functioning Condition | Functioning at Risk | Non-Functioning | Unknown |
|---|---|---|---|---|
| Big Horn | 0.0 | 0.2 | 0.1 | 0.3 |
| Carbon | 19.2 | 19.5 | 7.8 | 8.0 |
| Golden Valley | 0.0 | 0.6 | 0.0 | 0.0 |
| Musselshell | 4.3 | 17.6 | 3.5 | 0.0 |
| Stillwater | 6.0 | 0.3 | 1.4 | 1.8 |
| Sweet Grass | 0.8 | 0.5 | 0.3 | 3.8 |
| Wheatland | 0.0 | 0.3 | 0.0 | 0.5 |
| Yellowstone | 10.9 | 28.5 | 7.0 | 0.4 |
| **All Counties Total** | **58.5** | **67.5** | **8.0** | **12** |
| Percentages | 40 | 46 | 6 | 8 |

**Note:**
Source: BLM Internal Records – PFC Data

**Table 3-18 Functional Condition of Lentic Systems by County**

| County | Acres of Riparian | Wetland Name | Type | Assessment Date | PFC |
|---|---|---|---|---|---|
| Musselshell | 1.0 | Devils Basin | Playa | 9/2008 | FAR-U |
| Musselshell | 2.0 | Willow Reservoir | Reservoir | 8/2008 | FAR-U |
| Musselshell | 1.3 | Donaldson Reservoir | Reservoir | 5/2010 | FAR-U |
| Stillwater | 1.0 | Big Lake | Lake | N/A | Not surveyed |

| | | | | | |
|---|---|---|---|---|---|
| Carbon | 0.5 | Sage Creek | Reservoir | 8/2008 | PFC |
| Sweet Grass | 3.0 | Reed Point | Playa | 8/2008 | PFC |

**Note:**
Source: BLM Internal Records – PFC Data

The Table 3-17 indicates approximately 50 percent of the riparian areas in the decision area are functioning at risk. Decision-area-wide, the primary stressors that contribute to the FAR rating include: invasive and non-native vegetative infestations, bank alteration from livestock grazing, channel instability (both vertical and lateral), and lack of riparian obligate recruitment and riparian vigor. FAR ratings determined in the last decade, give or take a few years, may be attributed to climatic conditions (drought) that have stressed riparian systems throughout the decision area. These conditions are difficult to manage for, as they are relatively unpredictable. Livestock grazing systems that have succeeded in maintaining PFC in many areas pre-drought can have negative impacts on these systems during the drought (reduced vegetative cover, recruitment and vigor, and stream bank alteration). Trying to manage grazing impacts in response to drought conditions is challenging and can involve building fences and developing water sources to keep livestock out of riparian areas.

The Clean Water Act requires a list of water bodies that do not fully support beneficial uses such as aquatic life, fisheries, drinking water, recreation, industry, or agriculture. These inventories are known as 303(d) lists and characterize waters as fully supporting, impaired, or in some cases threatened for beneficial uses. The decision area has 14 segments of stream, river, or lake shore listed as impaired on the DEQ's 303(d) list. Riparian degradation can lead to water quality impairment. Table 3-19 lists those waters with riparian degradation as one of several causal factors by the MT DEQ. It is important to note that this riparian degradation is not necessarily found on BLM managed lands, as the stream segments generally cover many miles while BLM may only manage as little as 0.25 miles of the stream.

### Table 3-19 DEQ Impaired Waters List in the Planning Area

| **Impaired Water Bodies by 4th Level Hydrologic Unit Code (from 2010 Montana 303(d)/ 305(b) Intergraded Report)** | | | | |
|---|---|---|---|---|
| **4th Hydrologic Unit Code** | **Stream Segment on BLM Land** | **Estimated Miles in BLM Land** | **Probable Impairment Type(s)[A]** | **Probable Impairment Source(s)[B]** |
| Clarks Fork of the Yellowstone | Clarks Fork | 0.4 | 1, 3, 4, 9, 10, 12, 13 | 3, 4, 12,13 |
| | Silvertip | 9.6 | 1, 2, 3, 5, 6, 7, 8, 9, 10, 11 | 1, 2, 6, 7, 8, 9, 10, 11 |
| | Bear | 0.7 | 1, 2, 3, 4, 12 | 1, 2, 3, 4, 5 |
| | Cottonwood | .75 | 2, 5, 8 | 1, 2, 8, 9, 18 |
| Upper Yellowstone | Boulder | 0.14 | 1,2,4, | 2,3,12 |
| Middle Musselshell | Musselshell | 0.9 | 2, 10, 13 | 4, 6, 13, 18 |
| **Total** | | **12.49** | | |

Note:

[A] Cause: 1 = Nutrients, 2 = Alteration of Streamside Vegetation, 3 = Sediment, 4 = Metals, 5 = Oxygen Depletion, 6 = Specific Conductance, 7 = Turbidity, 8 = Total Dissolved Solids, 9 = Temperature, 10 = Flow Alterations, 11 = Toxic Organics, 12 = Harmful Algae, 13 = Habitat Alterations, 14 = Cyanide, 15 = Sulfates, 16 = Arsenic

[B] Source: 1 = Loss of Riparian Habitat, 2 = Rangeland Grazing; 3 = Irrigated Crop Production; 4 = Hydrologic Modification, 5 = Abandoned Mine Lands, 6 = Channelization, 7 = Impoundments, 8 = Riparian Grazing, 9 = Natural, 10 = Industrial Permitted, 11 = Spills, 12 = Unknown, 13 = Streambank Modification, 14 = Hard Rock Mining, 15 = Post Fire Runoff, 16 = Feedlots, 17 = Municipal Discharge, 18 = Agriculture

Best management practices, state, and federal guidance concentrate on protecting riparian habitat and function as well as water quality. A clear establishment of the importance of riparian health is critical in understanding the connectivity between riparian vegetation, water quality and quantity and aquatic resources. The following guidance, as well as the use of BMPs sets the foundation for BLM management of aquatic resources through sound habitat and water quality management.

### 3.6.4 Urban and Agricultural Lands

The urban land use and agricultural cover types comprise approximately 8,550 acres (2 percent) of the decision area. This area is covered by 30 percent or more of non-native species, including introduced and noxious weed species. Total vegetation cover ranges from 20 to 80 percent. Crested wheatgrass (*Agropyron cristatum*) and yellow sweet clover (*Melilotus officinalis*) are introduced species that have been used widely for rangeland pasture improvement. Such habitats are often used for early season livestock grazing. Urban areas are often dominated by bare ground and have been disturbed or altered by human use including irrigated and dryland crops, surface mining operations, and human settlements.

### 3.6.5 Invasive Species and Noxious Weeds

Noxious weeds, designated by Montana state law and county weed boards, are exotic plant species that may harm native plant communities. Most invasive plant species currently known to occur in south central Montana were originally introduced to North America from Europe and Asia (Sheley and Petroff 1999). Introductions were both intentional for various reasons or unintentionally brought in as contaminants of feed, seed, and ship ballast. Once established, these plants spread rapidly by natural (wind, water, and wildlife) and artificial (roads, equipment, and movement of contaminated feed and seed) means. These plants generally invade disturbed soils and stressed plant communities. Once established, many invade healthy plant communities and alter healthy plant systems. These aggressive invaders decrease wildlife habitat value, reduce livestock range productivity, and increase land management costs.

Noxious and invasive species move across jurisdictional boundaries and property lines; therefore, coordination and partnerships with local, state, tribal governments, and other federal agencies, as well as with interested organizations and individuals, is a critical management component. Noxious and invasive plant species in the planning area are currently managed using an integrated weed management (IWM) approach. This approach includes prevention, early detection and rapid response strategies; and priority inventory and treatment areas. Management of vegetation for resources and habitat enhancement is accomplished with a variety of treatment methods, including, but not limited to: herbicides, prescribed fire, manual and mechanical methods, and biological controls (insects, pathogens, and domestic grazing animals).

The BiFO cooperates with county weed boards in Yellowstone, Musselshell, Carbon, Stillwater and Sweet Grass counties through assistance agreements and Cooperative Week Management Areas (WMAs) for noxious weed management and control. The purpose of creating WMAs is to facilitate cooperation among all land managers and land owners to manage a common problem in common areas.

The formation of a WMA replaces jurisdictional boundaries that are barriers to weed management programs in favor of more logical boundaries that facilitate weed management and control. The advantages include, but are not limited to, establishing common priorities, channeled communication, and shared (and more secure) funding.

The Billings Field Office is currently a member of ten WMAs throughout the planning area. Cooperators include: USDA – USFS, USDOI – NRCS, Montana Department of Fish and Wildlife, Montana Department of Parks and Recreation, Montana Department of State Lands, county governments and weed boards, local land owners and land owner organizations.

Golden Valley and Wheatland counties do not have a weed board or a county weed department. Cooperation with the counties involves providing BLM funding to map, treat, and monitor noxious/invasive species; data and information exchange; and providing education to the general public.

Noxious plant lists are established on federal, state, and county levels. Table 3-20 outlines all noxious and invasive weed species currently designated by the State of Montana, the Noxious Weed Control Act and Administrative Rules of Montana (maintained as a county designation). The County Noxious Weed Control Act and Administrative Rules of Montana declare that each county is allowed to designate plant species as "noxious." The purpose of this list is to gather more information on potentially problematic weed species and monitor for occurrence or spread. Although there is no regulatory aspect to the list, information collected may be used to justify future inclusion on the state noxious weed list. BLM is currently building a national mapping database, NISIMS, which will be an information management system that would be used to track the mapping, treatment, and monitoring of invasive species (Map 13).

The State of Montana lists and prioritizes 34 state-designated noxious weeds based on the following prioritization:

- **Priority 1A (1 species) –** These weeds are not present in Montana. Management criteria will require eradication if detected, education, and prevention.
    - Yellow starthistle (*Centaurea solstitialis*)
- **Priority 1B (8 species) –** These weeds have limited presence in Montana. Management criteria will require eradication or containment and education.
    - Dyer's woad (*Isatis tinctoria*)
    - Flowering rush (*Butomus umbellatus*)
    - Japanese knotweed complex (*Polygonum spp.*)
    - Purple loosestrife (*Lythrum spp.*)

  - Rush skeletonweed (*Chondrilla juncea*)
  - Eurasian water milfoil (*Myriophyllum spicatum*)
  - Scotch broom (*Cytisus scoparius*)
  - Curlyleaf pondweed (*Potamageton crispus*)

- **Priority 2A (8 Species) –** These weeds are common in isolated areas of Montana. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts.
  - Tansy ragwort (*Senecio jacobea*)
  - Meadow hawkweed complex (*Hieracium spp.*)
  - Orange hawkweed (*Hieracium aurantiacum*)
  - Tall buttercup (*Ranunculus acris*)
  - Perennial pepperweed (*Lepidium latifolium*)
  - Yellowflag iris (*Iris pseudacorus*)
  - Blueweed (*Echium vulgare*)
  - Hoary alyssum (*Berteroa incana*)

- **Priority 2B (16 Species) –** These weeds are abundant in Montana and widespread in many counties. Management criteria will require eradication or containment where less abundant. Management is prioritized by local weed districts.
  - Canada thistle (*Cirsium arvense*)
  - Field bindweed (*Convolvulus arvensis*)
  - Leafy spurge (*Euphorbia esula*)
  - Whitetop (hoary cress; *Cardaria draba*)
  - Russian knapweed (*Centaurea repens*)
  - Spotted knapweed (*Centauria stoebe* or *maculosa*)
  - Diffuse knapweed (*Centaurea diffusa*)
  - Dalmatian toadflax (*Linaria dalmatica*)
  - St. John's Wort (*Hypericum perforatum*)
  - Sulfur cinquefoil (*Potentilla recta*)
  - Common tansy (*Tanacetum vulgare*)
  - Oxeye daisy (*Chrysanthemum leucanthemum* or *Leucanthemum vulgare*)
  - Houndstongue (*Cynoglossum officinale*)
  - Yellow toadflax (*Linaria vulgaris*)
  - Saltcedar (*Tamarix spp.*)
- **Priority 3 (2 Species) –** These weeds are regulated plants, not Montana listed noxious weeds. These regulated plants have the potential to have significant

negative impacts. The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research, education, and prevention to minimize the spread of the regulated plant.

- Cheatgrass (*Bromus tectorum*)
- Hydrilla (*Hydrilla verticillata*)

Russian olive (*Elaeagnus angustifolia*) is not listed as a state/county noxious weed species or a regulated plant; however, the BiFO is applying integrated weed management to this species. Russian olive is invasive due to high seed production and viability, seed longevity, seed dispersal by birds and mammals, vegetation reproduction following injury, drought and salt tolerance, and the ability to establish in the absence of disturbance in late successional communities. The Salt Cedar and Russian Olive Control Demonstration Act was signed into public law on October 11, 2006 for funding to assess extent of species infestation, demonstrate long term management, and assess economic means to dispose of biomass created when removing salt cedar and Russian olive. Russian olive site inventory is currently in process, and some management of these species is being conducted.

## Table 3-20 Noxious and Invasive Weed Species by County

| Common Name | Scientific Name | County Species Designations[1] | | | | | | | BLM Acre Class[2, 3] |
|---|---|---|---|---|---|---|---|---|---|
| | | Montana | Big Horn County, MT | Carbon County | Musselshell County | Stillwater County | Sweet Grass County | Yellowstone County | |
| Common burdock | *Arctium minus* | N/A | x | N/A | N/A | x | N/A | N/A | Low |
| Absinth wormwood | *Artemisia absinthium* | N/A | N/A | x | N/A | N/A | N/A | N/A | Low |
| Hoary alyssum | *Berteroa incana* | x (Priority 2A) | N/A | x | N/A | N/A | N/A | x | Rare |
| Flowering rush | *Butomus umbellatus* | x (Priority 1B) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Whitetop or hoary cress | *Cardaria draba* | x (Priority 2B) | N/A | x | x | x | x | x | Moderate |
| Musk thistle | *Carduus nutans* | N/A | N/A | x | N/A | N/A | x | N/A | Low |
| Diffuse knapweed | *Centaurea diffusa* | x (Priority 2B) | N/A | x | x | N/A | x | x | Low |
| Spotted knapweed | *Centaurea maculosa* | x (Priority 2B) | N/A | x | x | x | x | x | High |
| Russian knapweed | *Centaurea repens* | x (Priority 2B) | N/A | x | x | x | x | x | Low |
| Yellow starthistle | *Centaurea solstitialis* | x (Priority 1A) | N/A | N/A | N/A | x | N/A | N/A | Rare |
| Rush skeletonweed | *Chondrilla juncea* | x (Priority 1B) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Oxeye-daisy | *Chrysanthemum leucanthemum* | x (Priority 2B) | N/A | x | N/A | x | x | x | Low |
| Canada thistle | *Cirsium arvense* | x (Priority 2B) | N/A | x | x | x | x | x | High |
| Poison hemlock | *Conium maculatum* | N/A | x | N/A | N/A | N/A | N/A | x | Low |
| Field bindweed | *Convolvulus arvensis* | x (Priority 2B) | N/A | x | x | x | x | x | High |
| Common crupina | *Crupina vulgaris* | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Rare |
| Houndstongue | *Cynoglossum officinale* | x (Priority 2B) | N/A | x | x | x | x | x | Moderate |
| Scotch broom | *Cytisus scoparius* | x (Priority 1B) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Common teasel | *Dipsacus fullonum* | N/A | N/A | N/A | N/A | N/A | N/A | x | Low |
| Blueweed | *Echium vulgare* | x (Priority 2A) | N/A | N/A | N/A | N/A | x | N/A | Rare |
| Urban spurge | *Euphorbia agraria* | N/A | N/A | N/A | N/A | N/A | x | N/A | Low |
| Leafy spurge | *Euphorbia esula* | x (Priority 2B) | N/A | x | x | x | x | x | High |
| Orange hawkweed | *Hieracium aurantiacum* | x (Priority 2A) | N/A | N/A | N/A | N/A | x | N/A | Rare |
| Meadow hawkweed complex | *Hieracium 3-59retense, H. floribundum, H. piloselloides* | x (Priority 2A) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Black henbane | *Hyoscyamus niger* | N/A | x | N/A | N/A | N/A | x | N/A | Low |
| St. Johnswort | *Hypericum perforatum* | x (Priority 2B) | N/A | N/A | N/A | N/A | x | x | Rare |
| Yellowflag iris | *Iris pseudacorus* | x (Priority 2A) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Dyer's woad | *Isatis tinctoria* | x (Priority 1B) | N/A | x | N/A | N/A | N/A | N/A | Rare |
| Perennial pepperweed | *Lepidium latifolium* | x (Priority 2A) | N/A | N/A | N/A | N/A | N/A | N/A | Low |
| Dalmatian toadflax | *Linaria dalmatica* | x (Priority 2B) | N/A | x | x | N/A | x | x | Low Moderate |
| Yellow toadflax | *Linaria vulgaris* | x (Priority 2B) | N/A | x | x | x | x | x | Low |
| Purple loosestrife | *Lythrum salicaria, L. virgatum* | x (Priority 1B) | N/A | x | N/A | N/A | N/A | x | Rare |
| Eurasian water milfoil | *Myriophyllum spicatum* | x (Priority 1B) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Scotch thistle | *Onopordum acanthium* | N/A | N/A | x | x | N/A | N/A | N/A | Low |
| Japanese knotweed complex | *Polygonum cuspidatum, P. sachalinense, P. polystachyum* | x (Priority 1B) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Sulfur cinquefoil | *Potentilla recta* | x (Priority 2B) | N/A | x | x | x | x | x | Low |
| Tall buttercup | *Ranunculus acris* | x (Priority 2A) | N/A | N/A | N/A | N/A | x | x | Rare |
| Woodland sage | *Salvia nemorosa* | N/A | N/A | N/A | N/A | N/A | x | N/A | Low |
| Tansy ragwort | *Senecio jacobea* | x (Priority 2A) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Milk thistle | *Silybum marianum* | N/A | N/A | x | N/A | N/A | N/A | N/A | Low |
| Salt Cedar or Tamarisk | *Tamarix* spp. | X (Priority 2B) | N/A | x | x | x | x | x | High |
| Common tansy | *Tanacetum vulgare* | x (Priority 2B) | N/A | N/A | x | N/A | x | x | Low |
| Puncture vine | *Tribulus terrestris* | N/A | N/A | N/A | N/A | N/A | N/A | x | High |
| Common mullein | *Verbascum thapsus* | N/A | N/A | N/A | N/A | x | N/A | x | Low |
| Curlyleaf pondweed | *Potamageton crispus* | x (Priority 1B) | N/A | N/A | N/A | N/A | N/A | N/A | None |
| Cheatgrass | *Bromus tectorum* | x (Priority 3) | x | x | x | x | x | x | High |
| Hydrilla | *Hydrilla verticillata* | x (Priority 3) | N/A | N/A | N/A | N/A | N/A | N/A | None |

Note:

1 Golden Valley and Wheatland counties do not maintain a separate noxious weed list.
2 Acreage calculations based on historic data and map digitization; acreage calculations are not mutually exclusive.
3 BLM Class Values: None = 0; Rare = <1 acre; Trace = 1-5 acres; Low = 5-50 acres; Moderate = 50-500 acres; High = >500 acres.

As of July 2011, MT-DOA will no longer post county designated noxious weeds. County Weed Districts will now provide this information when requested.
Source: Montana Department of Agriculture 2008.

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Noxious weeds and invasive plant species are mostly associated with areas experiencing natural or manmade disturbances such as waterways, roads, recreational destinations, heavily utilized rangeland, pipelines, drilling pads, rights-of-way (ROWs), and livestock/wildlife paths and congregation areas. Table 3-20 indicates the presence of noxious weeds and invasive plant species in the planning area using historic data and map digitization. Acreage was calculated using data collected for the presence of weed species, acres of treatment evaluation, and acres of applied weed treatments.

## 3.6.6 Special Status Plants

Special status species are species listed as threatened or endangered under the Endangered Species Act (ESA), species proposed or candidates for listing, species designated as sensitive by BLM, and state listed species. These species require particular management attention due to population or habitat concerns.

Management of special status species on public lands administered by BLM occurs under a variety of laws, policies, and other requirements, as summarized in Chapter 1. There are no federally listed plants within the planning area.

There are 21 BLM sensitive plant species documented as occurring or containing suitable habitat in the decision area (Map 14). The BiFO inventories for presence of special status plant species and determines restrictions in areas with known populations on a case by case basis. Table 3-21 summarizes each species, its listed status, and known range and habitat associations in the decision area (BLM 2009).

There are nine areas of critical environmental concern (ACECs) in the decision area; however, only the Meeteetse Spires and East Pryor ACECs have documented special status plant species populations. The Shoshone carrot, a BLM sensitive species, has been identified in the Meeteetse Spires. The species population trend in the ACEC was recorded as stable. The ACEC Decision Record and Approved Amendment of the Billings, Powder River, and South Dakota RMPs identifies numerous management actions to protect the species and enhance associated habitats including, but not limited to, closures to livestock grazing, closure to entry for locatable minerals, closure to mineral material sales, no geophysical exploration, and OHV limitations on existing road and trails. The Shoshone carrot was also identified in the East Pryor ACEC; however, it was determined no further protection or habitat enhancement measures were needed to protect the population (BLM 1999).

**Table 3-21 Special Status Plant Species**

| Common Name[1] | Scientific Name[1] | BLM Status | Known Range and Habitat Associations |
|---|---|---|---|
| Nodding Rock Cress | *Arabis demissa var. languid (Boechera demissa)* | Sensitive | Primarily inhabits canyon bottoms and outwash plains with dry, stony soils derived from limestone. Known to occur in two places in the decision area, known only from Pryor Mountains and foothills vicinity and the Bighorn Canyon National Recreation Area (BCNRA). |
| Cushion | *Astragalus aretioides* | Sensitive | Primarily inhabits foothill and montane communities on exposed ridges and |

## Table 3-21 Special Status Plant Species

| Common Name[1] | Scientific Name[1] | BLM Status | Known Range and Habitat Associations |
|---|---|---|---|
| Milkvetch | *(Orophaca aretioides)* | | slopes in thin soil usually derived from limestone or calcareous sandstone in openings of Douglas-fir between 4,400 to 7,800 feet amsl. This species is endemic known mainly in the Pryor Mountains in Montana where there are three known occurrences. |
| Geyer's Milkvetch | *Astragalus geyeri* | Sensitive | Occupies loose sandy soil habitats with little or no organic matter in alluvial plains and terraces. This species is known to occur in the Pryor Mountain foothills at four sites. |
| Gray's Milkvetch | *Astragalus grayi* | Sensitive | Occupies open soil, valley habitats in sagebrush steppe communities. Species is known from three occurrences in the Pryor Mountain foothills. |
| Oregon Milkvetch | *Astragalus oreganus* | Sensitive | Occupies sandy soil habitats associated with the Chugwater Formation below 5,000 feet amsl often forming large colonies. A regional endemic of south central Montana and central Wyoming, five species occurrences are known in the decision area, restricted to the Pryor Mountain foothills. |
| Blackfoot River Evening-Primrose | *Camissonia andina (Oenothera andina)* | Sensitive | Occupies exposed, sandy soil habitats of dry prairie slopes, flats, and depressions in moist swales on south facing hillsides dominated by big sagebrush, curl-leaf mountain mahogany, and occasionally, Douglas-fir-Utah juniper woodlands between 4,000-6,200 feet amsl. Species is known from seven occurrences in the decision area, restricted to the south side of the Pryor Mountains. |
| Lewis River Suncup | *Camissonia parvula (Oenothera parvula)* | Sensitive | Occupies sandy soil habitats weathered from calcareous sandstone between juniper woodland and sagebrush steppe zones. Species is known from two occurrences in the decision area on the southern edge of the Pryor Mountains. |
| Yellow Spiderflower | *Cleome lutea* | Sensitive | Occupies open, often sandy soil of sagebrush steppe valley communities. Species is known from four occurrences in the decision area, restricted to the Pryor Mountain foothills. |
| Pinyon Desert Cryptantha | *Cryptantha scoparia* | Sensitive | Occupies dry, sandy, limestone uplands at approximately 4,500 feet amsl. Species is known from one location in the Pryor Mountains. |
| Spiny Hopsage | *Grayia spinosa* | Sensitive | Occupies dry shrublands in the valleys and foothills usually on sandy textured alkaline soils below 5,000 feet amsl. Species is known from 10 occurrences in the decision area and is restricted to the Pryor Mountain foothills. |
| Mat Prickly Phlox | *Leptodactylon caespitosum* | Sensitive | Occupies north or east facing slopes in dry, open sandy breaks confined to outcroppings of Chugwater sandstone. Species is known from 16 occurrences in the decision area and is restricted to the Pryor Mountain foothills. |
| Pryor Mountain Bladderpod | *Lesquerella lesicii (Physaria lesicii)* | Sensitive | Occupies two distinct vegetation types: (1) woodlands with a sparse overstory of Rocky Mountain juniper-mountain mahogany on moderate to steep, usually warm slopes between 5,300-6,300 feet amsl, and (2) open, south facing, gentle slopes of exposed ridge crests surrounded by forests in bunchgrass/cushion plant communities. Species is known from 10 occurrences in the decision area, is endemic to the Pryor Mountains, and restricted to a few areas of limestone outcrops in the eastern Pryor |

**Table 3-21 Special Status Plant Species**

| Common Name[1] | Scientific Name[1] | BLM Status | Known Range and Habitat Associations |
|---|---|---|---|
| | | | Mountains. |
| Torrey's Desert Dandelion | *Malacothrix torreyi (M. sonchoides v. torreyi)* | Sensitive | Occupies sandy alluvium, five occurrences are known from the south side of the Pryor Mountains. |
| Dwarf Mentzelia | *Mentzelia pumila* | Sensitive | Occupies open habitats, usually characterized by sandy soil in desert shrubland and woodland valley and foothill zones. Species is known from 16 occurrences in the Pryor Mountain foothills. |
| Leafy Nama | *Nama densum* | Sensitive | Occupies sandy soil habitats weathered from outcrops of calcareous sandstone and is known from one site in the Pryor Mountain foothills. |
| Wasatch Bluegrass | *Poa arnowiae* | Sensitive | Occupies sparsely vegetated soil of Douglas-fir forest floors in the montane zone and is known from one occurrence in the Pryor Mountains. |
| Platte River Cinquefoil | *Potentilla plattensis* | Sensitive | Occupies grassland and sagebrush steppe habitats in the valley and montane zones. Species is known from one site in the decision area in the Pryor Mountains. |
| Largeflower Goldenweed | *Pyrrocoma carthamoides* var. *subsquarrosa (Haplopappus carthamoides* var. *subsquarrosus)* | Sensitive | Occupies grassland and sagebrush habitats dominated by bunchgrasses or bunchgrass with sagebrush, frequently found on cooler, moderate to steep slopes. Species is known from eight occurrences in the decision area and is a regional endemic restricted in Montana to the eastern front of the Beartooth and Pryor mountain foothills. |
| Persistent Sepal Yellowcress | *Rorippa calycina* | Sensitive | Occupies sparsely vegetated, moist sandy to muddy banks of streams, stock ponds, and manmade reservoirs near the high water line. Species is only known from one historic site in the decision area. |
| Shoshone Carrot | *Shoshonea pulvinata* | Sensitive | Occupies open, exposed limestone outcrops, ridge tops, and canyon rims in thin rocky soils. Species is known from six occurrences in the decision area and is a regional endemic species to the Absaroka, Owl Creek, and Pryor mountains of Park and Fremont counties, Wyoming and Carbon County, Montana. In addition, stable populations have been identified in the Meeteetse Spires and East Pryor Mountains ACECs. |
| Salty Buckwheat | *Stenogonum salsuginosum (Eriogonum salsuginosum)* | Sensitive | Occupies bentonite soils in dry, open slopes of breaklands at approximately 4,700 feet amsl. Species is known from two small populations documented on the south side of the Pryor Mountains. |

**Note:**
[1] Species nomenclature consistent with the USDA PLANTS database (USDA 2009).
amsl = above mean sea level
Source: BLM 2009, USDA 2009.

## 3.7 Wildlife Habitat and Special Status Species

Wildlife species in the BiFO planning area include big game animals, raptors, upland game birds, and other species. These populations are managed by the U.S. Fish and Wildlife Service (USFWS) and Montana Fish, Wildlife and Parks (MTFWP). The BLM works cooperatively

with these agencies to manage wildlife habitat on public lands. Therefore, the BLM is directly responsible for managing fish and wildlife habitat on public lands and is indirectly responsible for the health and well-being of fish and wildlife populations supported by habitats on public lands.

Distribution and abundance of wildlife in the decision area are primarily functions of habitat availability and conditions. Wildlife habitat is best characterized by the various vegetation cover types in the decision area (Vegetative Communities Section). The diversity of habitat types in the decision area is high (37 types) and ranges from moderate/high cover grasslands to Douglas-fir forests. Habitat types are a subcategory of vegetation cover types and are defined as a land area that supports, or has the potential of supporting, the same primary climax vegetation. For example, a shrubland vegetation cover type could be composed of several species of sagebrush and other shrub habitat types.

These 37 habitat types can be grouped into the following primary vegetative communities: grasslands, shrublands, forests, riparian/wetlands, and urban and agricultural lands (see Table 3-12). The most common vegetation community is grassland and shrubland, which represents approximately 87 percent of the decision area, and the least common community type is agricultural lands, which represents 2 percent of the decision area. Carbon County has the northern most extension of the Big Horn Basin cold desert into Montana. This area creates additional floral and faunal species diversity due to its northern cold desert climate. For example, this is the only area in Montana that has white-tailed prairie dogs and a breeding population of blue-gray gnatcatchers.

The diversity and populations of fish and wildlife throughout the decision area provide considerable recreational opportunity and economic benefit. The species listed in Table 3-22 characterize fish and wildlife resources in the planning area and include game species, species vulnerable to impacts, and species with high economic or recreational value.

## 3.7.1 Wildlife Habitat Threats

Fragmentation of habitats and corridors continues to be an ongoing problem for wildlife. There are seven large blocks of public land over 5,000 acres in the decision area. Refer to Map 1 and 1a for locations of the large blocks of public land. The remaining public land is mixed ownership of scattered public lands. Wildlife management opportunities for the BLM are very limited on the small or scattered tracts of public land. Wildlife species that are mobile, such as big game and birds, are affected by management of habitat on the surrounding ownerships. BLM can effectively manage wildlife habitat on the large blocks of public land, although management options are less effective on scattered public lands, due to the influence of habitat management on surrounding areas. Maintaining connectivity and continuity of habitat with scattered land ownership is difficult. Conversely, these small tracts of relatively undisturbed public land can provide valuable islands of native habitat, native species, and biodiversity.

Wildlife habitat threats in the scattered public land ownership include: habitat loss and conversion from construction and farming; subdivisions with the associated infrastructure developments; rights-of-ways for pipelines, power lines, roads, and fences; disturbances from

human activities; and noxious weeds. All of these actions can prevent wildlife movement and reduce, eliminate, or fragment wildlife habitat and quality.

## 3.7.2 Priority Wildlife Species

Priority wildlife species include game animals and non-game species of special interest. The latter includes those species considered to have a unique role in the ecosystem, are of public interest, have a low abundance or declining population, are associated with rare habitats, have potential threats, may be sensitive to BLM management activities, and have a majority of their habitat on BLM lands. Availability and quality of data vary for individual species. Refer to Maps 15-23 and 25 for some of the wildlife and big game species maps.

Priority wildlife species for the planning area are bighorn sheep, white-tailed prairie dog, spotted bat, pallid bat, sage grouse, peregrine falcon, golden eagles, mountain plover, blue-gray gnatcatcher, pale milksnake, western hog-nosed snake, and Yellowstone cutthroat trout. These species are identified to further emphasize species and habitat management importance for these species on BLM lands. These species are described further in the following narrative and tables.

## Table 3-22 Habitat for Priority Wildlife Species in the Planning Area

| Species | Occurrence in Planning Area | General Habitat Associations | Abundance & Trends in Area |
|---|---|---|---|
| Mule deer | Most abundant big game species. | Use wide variety of habitat; generally prefer sagebrush, grassland, and conifer areas. | Mule deer populations in prairie habitats are below levels in the early 1990s and mountain mule deer populations are well below levels of the 1980s and 1990s.[a] |
| White-tailed deer | Well distributed throughout suitable habitat. | Prefer riparian drainage bottoms and conifer forests. | White-tailed deer populations in south-central Montana have remained relatively stable at above average levels. [b] |
| Pronghorn antelope | Second most abundant big game species. | Use grasslands, sagebrush and other shrub-grasslands, and agricultural fields. | From 1998 to 2006 numbers increased in most districts. Low fawn numbers and a bluetongue outbreak during 2007 have resulted in reduced antelope populations in many districts during 2007 and 2008. [b] |
| Rocky Mountain elk | Common in Beartooth and Bull mountains; less common in south-central portion of the planning area. | Use grasslands, shrub-grasslands, woodlands, and riparian/wetlands. | Of the 14 Elk Management Units (EMUs) 6 showed population increases, 7 showed population declines and 1 unit was not inventoried. [b] |
| Bighorn sheep | Occur as a single herd -in the Pryor Mountains. | Use cliffs, mountain slopes, and rolling foothills with open to semi-open conditions (rocks, grasses, shrubs). | Pryor Mountain population trend has been increasing since 2003 with 78 bighorn sheep in 2008. Hunting was initiated in 1990. Three ram permits have been issued since 2005 and three either-sex permits were issued beginning in 2008. [b] |
| Moose | Historically, in the Boulder River and Beartooth Mountain foothills. | Often use southerly aspects in winter, forest, wet meadows, and riparian/wetland areas. | Flight efficiencies are too variable to make any statements about moose population trends. [b] |
| Black Bear | Pryor Mountains and Beartooth Front. | Forested habitats in the mountain ranges. | Population data is unavailable, although according to observations of cubs/female the population trend appears to be static and close to the average over 27 years of data.[b] |
| Mountain Lion | Widespread, concentrated where deer and elk prey base is available | All habitats where deer and elk are present. | Population data is unavailable, although according to the report, ranges have expanded substantially to previously uninhabited areas due to the distribution and habitat expansion of deer and elk, their primary prey base. [b] |
| *Furbearers-*<br>Bobcat, wolverine, marten, fisher, beaver, muskrat, mink, otter | Widespread over Field Office | Variable depending on the species | • Population trends are unknown.<br>• Trapping harvest data in 2008 indicate beaver, muskrat, coyote, mink, weasel, fox, and badger were 46% below the long term average from 1993-2009.<br>• Total number of bobcats trapped has steadily increased from 1995 to 2009. [b] |

| Species | Occurrence in Planning Area | General Habitat Associations | Abundance & Trends in Area |
|---|---|---|---|
| *Upland Birds:*[1]<br>Sharp-tailed grouse, blue grouse, ruffed grouse, wild turkey, ring-necked pheasant, Hungarian partridge, chukar partridge | Generally well distributed throughout suitable habitat. | • Sharp-tailed grouse use grasslands, shrub-grasslands, woodlands, riparian/wetlands, and agricultural areas.<br>• Wild turkey use forested riparian areas, use Ponderosa pine hillsides, agricultural fields.<br>• Ring-necked pheasant use riparian bottoms with adjacent agricultural fields.<br>• Hungarian partridge use grasslands with interspersed agricultural fields and brushy/weedy areas. Chukar partridge are found in the broken terrain in south Carbon County. | • Sharp-tailed grouse are declining in abundance.[c]<br>• Hungarian partridge population in the state has been increasing since the 1940s due to increased grain production.[d]<br>• 2009 harvest data indicate blue grouse harvest at 12% below average and ruffed grouse 10% above average.<br>• 2010 data show ring-necked pheasant population trends down 11%.<br>• Wild turkey harvest data indicates an upward trend in populations.[b]<br>• Population trend data is not available for chukar partridge. |
| *Bats:*<br>Spotted, Townsend's Big-Eared, Pallid, Hoary, Fringed Myotis | Not well known other than caves. | Primarily caves and forested or riparian areas. | Data is not available. |
| Waterfowl | Well distributed throughout suitable habitat. | Use reservoirs, wetlands, and rivers. | Information is not available. |
| Raptors | Well distributed; riparian areas are important habitat for raptors in BiFO. | Utilize key habitat features such as Cliffs, Steep banks, structures, large trees, etc. | Information is not available. Peregrine falcon and bald eagle populations increasing. |
| *Reptiles*:<br>Spiny softshell Turtle, Snapping turtle, Western hog-nosed snake, pale milksnake, greater short-horned lizard, common sagebrush lizard | Some species such as pale milksnake and western hog-nosed snake not well documented; other species well distributed in suitable habitat. | Turtles in large rivers and snakes and lizards in open and rocky shrublands. | Population trend data is not available. |

**Note:**

1 [1] Greater sage-grouse are addressed in the Special Status Species section.
2 [a] Source: Progress Report (MFWP, 2007 – 2008)
3 [b] Source: Progress Report (MFWP, 2009 – 2010)
4 [c] J. Newell, pers. comm. 2005
5 [d] MTFWP and MNHP 2005

## 3.7.3 Terrestrial Wildlife

### 3.7.3.1 Big Game

Big game species in the planning area include mule deer, white-tailed deer, pronghorn antelope, Rocky Mountain elk, bighorn sheep, moose, black bear, and mountain lion. Winter is a crucial and stressful time for big game; therefore, winter range is often the focus of management and a criterion for analyzing the impacts to big game from resource management (see Table 3-22). Big game maps are included in Appendices/ Maps 16-20, and will be updated as information becomes available.

Threats to big game habitat in the decision area are direct habitat loss, disturbance from human activities, fragmentation from habitat loss, and barriers to movement such as fencing. The greatest barrier to big game movements are woven-wire or net-wire fences, particularly for young big game. Currently, there is not an inventory of fences not meeting BLM fencing standards. Most of the net-wire fences exist along highway and road rights-of-ways.

**Table 3-23 Big Game Habitat and Distribution by Land Ownership in the Planning Area**

| Species | Habitat/Distribution | BLM | Total |
|---|---|---|---|
| Mule Deer | Year round distribution | 428,896 (5%) | **8,506,948** |
| | General winter range | 93,099 (3%) | **2,942,431** |
| | Crucial winter range | 72,432 (5%) | **1,335,622** |
| White-tailed Deer | Year round distribution | 70,673 (2%) | **3,208,637** |
| | General winter range | 25,439 (2%) | **1,295,443** |
| | Crucial winter range | 6,076 (3%) | **205,530** |
| Pronghorn Antelope | Year round distribution | 179,690 (4%) | **4,859,757** |
| | General winter range – not identified | — | **—** |
| | Crucial winter range | 35,086 (8%) | **454,789** |
| Rocky Mountain Elk | Year round distribution | 79,353 (1%) | **7,734,652** |
| | General winter range | 12,240 (2%) | **586,235** |
| | Crucial winter range | 13,567 (6%) | **229,393** |
| Bighorn Sheep | Year round distribution | 13,875 (4%) | **358,368** |
| Moose | Year-round distribution | 12,595 (2%) | **791,814** |
| | General winter range | 3864 (1%) | **278,996** |
| | Crucial winter range | * | * |
| Gray Wolf | FWP Wolf District | 34,457 (2%) | **1,529,493** |
| Lynx | Year-round distribution | 0 | **528,367** |
| Grizzly Bear | Year-round distribution | 0 | **140,674** |

**Note:**

Source: Crucial winter range values taken from Montana Fish Wildlife & Parks Historic (1970s) inventory data. All other data obtained from the Montana Fish Wildlife and Parks website: http://fwp.mt.gov/doingBusiness/reference/gisData/default.html/ Last accessed 01/14/2010

#### 3.7.3.1.1 Mule Deer

Mule deer are the most abundant big game species in the planning area and use the greatest variety of habitats (refer to Table 3-23 and Map 19 [Mule Deer Distribution]). Areas of year-round mule deer distribution total over 8 million acres in the planning area, with about 5 percent of that acreage on BLM public lands. An important limiting factor for mule deer, as well as other big game in the planning area, is the availability of winter range (Map 15 – Big Game Winter Range).

Spring and summer drought reduces forage abundance and, therefore, populations fluctuate. Only a small area of mule deer winter range is documented in the MTFWP database.

#### 3.7.3.1.2 White-tailed Deer

Although less abundant than mule deer, white-tailed deer are common in the planning area (Table 3-23). White-tailed deer prefer riparian drainage bottoms and conifer areas and will also use a variety of other habitats (Map 20 – White-tailed Deer Range Distribution).

Approximately 25,439 acres or 2 percent of the over 3 million acres of white-tailed deer habitat in the planning area is on public lands.

#### 3.7.3.1.3 Pronghorn Antelope

Pronghorn antelope are the second most abundant big game species in the planning area (Table 3-23). These animals are generally associated with grasslands and shrublands, and they will also use agricultural fields (Map 16 – Antelope Range Distribution). Approximately 179,690 acres or 4 percent of the more than 4 million acres of pronghorn antelope habitat in the planning area are on BLM public lands. Currently, Antelope Winter range has not been designated by MTFWP in the planning area. Historically, there were 35,086 acres of Antelope Crucial Winter Range identified in the planning area. Documented crucial winter range for pronghorn antelope was most abundant in Sweet Grass, Golden Valley, Musselshell, Yellowstone and Carbon counties. Antelope populations reached record high numbers in 1990-1994, declined from 1995-1997, and generally have increased since 1998. Habitat conditions for antelope are unknown, other than that extensive drought may have decreased forage availability. Portions of the planning area have been affected by outbreaks of blue tongue disease.

#### 3.7.3.1.4 Rocky Mountain Elk

Rocky Mountain elk are associated with grasslands, shrublands, woodlands/forests, and riparian/wetlands (Table 3-23). This species is common in the Bull, Snowy, Crazy, and Beartooth mountains foothills in the planning area (Map 18 – Elk Range Distribution). A recent increase in elk populations into new areas where there is more open sagebrush/grassland and open timber types have been observed. Summer habitat is primarily in the Bull Mountains and foothills of the decision area. Winter habitat is concentrated in the mountain foothills and the area south of the Bull Mountains. There are 14 known elk herds in the planning area. The 2010 population trends were up in six herds, down in seven elk herds, and one herd not inventoried, when compared to 2008 -2009 population levels.

#### 3.7.3.1.5 Bighorn Sheep

Rocky Mountain bighorn sheep occur as a single herd and occupy areas on USFS, National Park Service (NPS), BLM, state, and private lands surrounding the east and west Pryor Mountains. Approximately 13,875 acres or 4% percent of the occupied area occurs on BLM public lands (Map 17 –Bighorn Sheep Range Distribution). Historically, there was a herd along the Boulder River but died out due to disease. Habitats include cliffs, mountain slopes, and rolling foothills. A 2008 survey for bighorn sheep indicated the second highest population count since 1997.

#### 3.7.3.1.6 Moose

Moose are associated with forested and riparian/wetland areas of the Beartooth Mountains. Populations have remained static. Seasonal habitat data from the 1970s indicate there are approximately 3,864 acres of moose winter range on BLM lands, or 1% of total winter range, and little summer range in the decision area.

#### 3.7.3.1.7 Black Bear

Black bears use a variety of habitats depending on seasonal variation in diet and availability of food. Black bears are omnivorous; however, much of their diet consists of berries, fruits, grasses, sedges, and inner bark. In the planning area, black bears tend to prefer dense forested areas, riparian areas, open slopes, and mountain meadows (Foresman 2001). Black bears tend to be relatively tolerant of land uses since they have a large home range and can utilize a variety of habitats. Recreation, road development, and timber management are land uses that bears tolerate less.

#### 3.7.3.1.8 Mountain Lion

Mountain lions are distributed throughout the planning area where suitable habitat is present. They use different habitat types, depending on prey availability, cover, and preference for areas with minimal human disturbance. Mountain lions typically prefer mountainous and foothill areas; however, in eastern Montana, they are commonly associated with riparian areas and woody draws. Mountain lions are carnivorous and feed on a variety of animals. However, they prefer deer, elk, porcupines, and rabbits.

#### 3.7.3.1.9 Furbearing Animals

Furbearing animals in the planning area include otter, beaver, bobcat, mink, weasel, muskrat, and marten. Bobcats are habitat generalists and can be found throughout the planning area, although bobcat do not occupy high mountain areas. Beaver, mink, and muskrat are common in the waters and riparian areas throughout the planning area. Marten occur in forested regions of the mountains in the planning area. Short-tailed weasels are found in coniferous forest, riparian shrub, and meadow habitats, while long-tailed weasel are typically found in rock outcrops near water in desert shrub, grassland, and riparian shrub habitats (Cerovski et al. 2004).

#### 3.7.3.1.10 Game Birds

Upland game birds common to the planning area include sharp-tailed grouse, greater sage-grouse, blue grouse, ruffed grouse, wild turkey, ring-necked pheasant, Hungarian, and chukar partridge (Table 3-24). Greater sage-grouse is considered a special status species and is addressed further in the Special Status Species section. Primary threats to upland game bird populations in the planning area include habitat loss, habitat fragmentation, possibly West Nile virus, and adverse weather conditions. Hunting pressure can also affect upland game bird population locations where hunting pressure is concentrated, such as Pompeys Pillar. Hunted birds may move to adjacent habitat as hunting pressure increases. However, as with big game, MTFWP regulates upland game bird hunting.

Waterfowl species common in the planning area include Canada and snow geese and 18 species of ducks (Table 3-25). The presence of open water is the most important factor for waterfowl production. Grassland habitats adjacent to open water are also important for waterfowl in the planning area. There are 241,079 acres of open water habitat in the planning area including rivers, streams, natural potholes, and artificial reservoirs. Natural and constructed islands on reservoirs are important to Canada geese and some duck species because they provide security from predators during nesting and brood rearing. In addition to the breeding season, waterfowl

use the planning area during spring and fall migrations seeking agricultural fields, wetlands, and major rivers such as the Yellowstone, for roosting, cover, and feeding.

The Bundy Island area, just west of Pompeys Pillar, NM in Yellowstone County, and other river bottom riparian areas provide brood rearing habitat for Canada geese and other waterfowl species. Other wildlife such as bald eagles, white-tailed deer, ring-necked pheasants, numerous furbearers, and various non-game species inhabit the island. Bundy Island is one of the few islands in the Yellowstone River managed by the BLM.

**Table 3-24 Upland Game Bird Habitat and Distribution by Ownership in the Planning Area**

| Species | Habitat/Distribution | BLM[4] | Total |
|---|---|---|---|
| Sharp-Tailed Grouse[1] | Overall distribution | 307,236 (4%) | **8,263,040** |
| Wild Turkey[2,3] | | 74,044 (4%) | **2,055,715** |
| Ring-Necked Pheasant[2] | Good/excellent habitat | 9094 (2%) | **438,250** |
| | Fair habitat | 2081 (1%) | **219,139** |
| | Total pheasant habitat | 11,175 (2%) | **637,389** |
| Hungarian Partridge[2] | Overall distribution | 292,975 (3%) | **8,584,264** |
| Chukar | No data available | No data | **No data** |
| Blue Grouse | | 97,649 (4%) | **2,354,033** |
| Ruffed Grouse | | 139,107 (8%) | **1,837,558** |

**Note:**
a. Totals may not add up, due to rounding errors.
1. Data are from BLM 2000a.
2. Data from MTFWP.
3. Distribution and habitat data for wild turkey and ring-necked pheasant on tribal/BIA land are incomplete.
4. There are no areas designated as potential (unoccupied) turkey habitat in the Billings decision area.
5. Numbers in parentheses are the percent of habitat located on BLM-administered land.

**Table 3-25 Waterfowl Species Known to Occur in the Planning Area**

| Dabbling Ducks | Diving Ducks | Other Waterfowl |
|---|---|---|
| American widgeon | Bufflehead | Canada goose |
| Barrow's goldeneye | Canvasback | Snow goose |
| Blue-winged teal | Common goldeneye | |
| Cinnamon teal | Common merganser | |
| Green-winged teal | Redhead | |
| Gadwall | Ring-necked duck | |
| Harlequin duck | Ruddy duck | |
| Mallard | Lesser scaup | |
| Northern pintail | | |
| Northern shoveler | | |
| Wood duck | | |

**Note:**
Source: BLM 2000a

### 3.7.3.2 Non-Game Animals

Various non-game species occur in the planning area including small mammals, bats, songbirds, raptors, reptiles, and amphibians. Non-game mammals include an undetermined number of small mammals such as ground squirrels, mice, chipmunks, rabbits, skunks, and raccoons that provide the main prey for raptors and larger carnivores.

Raptors and other migratory birds are protected under the Migratory Bird Treaty Act. Under Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, federal agencies are required to address migratory birds in all of their activities. A wide variety of migratory birds reside in the planning area, and species are generally associated with particular habitat types. Migratory birds with declining population trends and/or those associated with uncommon habitats, as identified through the Montana Partners in Flight Bird Conservation Plan, are of the greatest conservation concern (Casey 2000).

Montana Audubon and the National Audubon Society has identified one Important Bird Area (IBA) in the planning area at Bear Canyon in the foothills of West Pryor Mountain, near the Wyoming border. The area is four square miles, and the Utah juniper supports breeding populations of more than a dozen species on the Montana Priority Bird Species List. The foothill canyons in the area have the only known breeding location of blue-gray gnatcatchers in Montana (Audobon.org).

Currently, approximately 94 raptor nests are documented in the planning area, of which 28 raptor nests are on BLM administered surface land. Not all of these nests are occupied. Raptors include eagles, hawks, owls, falcons, and vultures, and the planning area provides seasonal and year round habitat for a multitude of raptor species. Raptor utilization for specific and region wide areas varies greatly year to year and season to season depending on prey availability, habitat quality, level of raptor populations, and other factors. Common breeding raptors in the planning area include Swainson's hawk, ferruginous hawk, red-tailed hawk, northern harrier,

golden eagle, prairie falcon, American kestrel, and great-horned owl. Of these raptors, golden eagle and great-horned owl are year round residents, and smaller winter populations of red-tailed hawk and northern harrier occur in the planning area.

The Special Status Species section addresses the bald eagle, golden eagle, ferruginous hawk, Swainson's hawk, burrowing owl, northern goshawk, and peregrine falcon. Other raptor species found during various times of the year include rough-legged hawk, a winter resident; snowy owl, a rare winter visitor; long-eared owl, a denizen of open and forested areas; and short-eared owl. Ospreys are common summer residents along major river and stream systems in the planning area.

Forest raptors in the planning area include sharp-shinned hawk, Cooper's hawk, northern goshawk, and northern saw-whet owl. Management direction for the BLM is identified in the *BLM Fish and Wildlife 2000 Raptor Habitat Management Plan* (BLM 1992b). Management procedures and activities for raptors have been identified by the USFWS management guidelines (USFWS 2002) and Avian Protection Plan guidelines (APLIC and USFWS 2005). Golden eagles also are protected under the Bald and Golden Eagle Protection Act and the Eagle Act.

Raptors have specific nesting territory requirements, including vegetation structure and diversity. Requirements for physiographic features (elevation, slope), as well as prey availability, vary by species. Raptors typically reuse the same nesting territory for years, and alterations to these areas could reduce the viability of raptor populations. Threats to raptors include loss of habitat, reduction in food supply, and disturbance during nesting. Habitat loss from changing land use to industrial, agricultural, or recreational could reduce available food supply or alter nesting territories. Each raptor nest, its offspring, and supporting habitat are considered important to the long term viability of raptor populations.

Generally courtship, nest construction, incubation, and early brooding are considered higher risk periods during which adults are easily prone to temporarily or permanently abandon nests in response to disturbance. This may result in abandonment of eggs or young. Loss or alteration of habitat for any raptor species can also result in a loss of or change in the raptor prey base or historical nesting territories (USFWS 2002).

The Billings Field Office harbors the greatest diversity of bat species in Montana, including 3 species listed as Sensitive by the BLM, MFWP, and Montana Natural Heritage, including spotted bat, Pallid bat, and Townsend's big-eared bat. Ten bat species have been documented, and the potential exists for additional species to be present (Hendricks et al., 2004).

Other animals include amphibians, which are considered a special management group of species due to their association with rare habitats (wetlands and riparian areas), their sensitivity to environmental conditions, global population declines for some species, and the limited knowledge regarding their occurrence and distribution in the planning area. Amphibians that are known or expected to occur in the planning area include the tiger salamander, plains spadefoot, Great Plains toad, Woodhouse's toad, boreal chorus frog, and northern leopard frog (Table 3-22).

### 3.7.3.3 Wildlife Special Status Species

Special status species are species listed as threatened or endangered under the Endangered Species Act (ESA), species proposed or candidates for listing, species designated as sensitive by BLM, and state listed species. These species require particular management attention due to population or habitat concerns.

Management of special status species on public lands administered by BLM occurs under a variety of laws, policies, and other requirements, as summarized in Chapter 1. No management actions are permitted on BLM lands that would jeopardize the continued existence of species that are federally listed, proposed for listing, or candidates for listing. Consultation is required on any action that a federal agency proposes that (1) may adversely impact a federally listed species, or (2) will result in jeopardy or adverse modification of critical habitats. BLM Manual 6840 - Special Status Species Management (BLM 2008) addresses management with the objectives to:

1) Conserve listed species and the ecosystems on which they depend

2) Ensure that actions requiring authorization or approval by the BLM are consistent with conservation needs of special status species and do not contribute to the need to list special status species either under the provisions of the ESA or BLM Manual 6840

3) Prioritize needed conservation work with an emphasis on habitats (BLM 2008)

BLM sensitive species are defined as species that:

- Could become endangered in or extirpated from a state, or within a significant portion of its distribution
- Are under status review by the usfws and/or the national marine fisheries service (nmfs)
- Are undergoing significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution
- Are undergoing significant current or predicted downward trends in population or density such that federally listed, proposed, candidate, or state-listed status may become necessary
- Typically have small and widely dispersed populations
- Inhabit ecological refugia or other specialized or unique habitats, or
- Are state listed, but which may be better conserved through application of BLM sensitive species status.

For federally listed species that do not have critical habitat designated, BLM cooperates with the USFWS to determine and manage habitats of importance. The USFWS provides regulatory

oversight for all fish, plant, and wildlife species listed as threatened or endangered, proposed for listing, or that are candidates for listing under the ESA. Management of federally listed species and the designation of critical habitats are overseen by the USFWS in accordance with the ESA.

BLM, Montana State Office entered into a Memorandum of Understanding (MOU) with the USFWS, Montana Field Office, to improve the efficiency and effectiveness of plan level Section 7 consultation processes under the ESA. The MOU states that during planning BLM agrees to promote conservation of candidate, proposed, and listed species and to consult on RMP effects for listed species, confer on RMP effects for proposed species, and develop conservation strategies for candidate species (BLM-MOU-MT923-0402, June, 2004). The BLM maintains specific goals of contributing to the recovery of species currently listed under the ESA and to promoting the recovery and conservation of all special status animal and plant species in the planning area

### 3.7.3.4 Special Status Wildlife in Planning Area

There are 48 special status wildlife species that occur in the planning area (Table 3-26). Four species are listed under the ESA: the black-footed ferret (endangered), the grizzly bear (threatened), the Canada lynx (threatened), and the whooping crane (endangered). Three species, the gray wolf, peregrine falcon, and bald eagle, were delisted; however, they are considered BLM sensitive species. No critical habitat for ESA listed species occurs in the planning area.

In addition, migratory birds have special protections through the Migratory Bird Treaty Act and Executive Order 13186. Two federally listed species (the black-footed ferret and grizzly bear) had historically occurred in the planning area but are no longer present. The grizzly bear recovery zone has been identified along the FS/BLM boundary in the Beartooth Mountain foothills. Grizzly bears and wolves may be occasional migrants on BLM lands and still require consideration in BLM activities. Lynx exist along the perimeter of the planning area on FS lands; however, there are no Lynx Analysis Units, (management areas that contain suitable lynx habitat and approximate the size of a female home range (Ehle and Keinath 2002), identified on public lands in the planning area. Lynx may be occasional migrants onto public lands. Whooping cranes may also be an occasional migrant into the planning area. If prairie dog populations expand in the future, the possibility exists that black-footed ferrets may be considered for reintroduction into portions of the planning area, particularly in Musselshell County. Due to that possibility, they are included in this section, although habitat suitability models would have to be analyzed. Sources of information include GIS data from the BLM, MTFWP, the 1984 RMP, communications with regional biologists (BLM, USFWS and MTFWP), and a literature review.

## Table 3-26 Special Status Wildlife Species in the Planning Area

| Common Name | Scientific Name | Federal Listing | Status[1] BLM Listing | State Listing |
|---|---|---|---|---|
| **Mammals** | | | | |
| Black-footed Ferret | *Mustela nigripes* | LE, XN | Special Status | S1 |
| Black-tailed Prairie Dog | *Cynomys ludovicianus* | | Sensitive | S3 |
| Fringed Myotis | *Myotis thysanodes* | | Sensitive | S3 |
| Gray Wolf | *Canis lupus* | DM | Sensitive | S3 |
| Grizzly Bear | *Ursus arctos* | LT | Sensitive | S2S3 |
| Meadow Jumping Mouse | *Zapus hudsonius* | | Sensitive | S2 |
| Pallid Bat | *Antrozous pallidus* | | Sensitive | S2 |
| Spotted Bat | *Euderma maculatum* | | Sensitive | S2 |
| Townsend's Big-eared Bat | *Corynorhinus townsendii* | | Sensitive | S2 |
| White-tailed Prairie Dog | *Cynomys* leucurus | | | |
| Wolverine | *Gulo gulo* | Candidate | Sensitive | S3 |
| Canada Lynx | *Lynx canadensis* | LT | Special Status | S3 |
| **Birds** | | | | |
| Baird's Sparrow | *Ammodramus bairdii* | | Sensitive | S3B |
| Bald Eagle | *Haliaeetus leucocephalus* | DM | Sensitive | S3 |
| Black Tern | *Chlidonias niger* | | Sensitive | S3B |
| Bobolink | *Dolichonyx oryzivorus* | | Sensitive | S3B |
| Brewer's Sparrow | *Spizella breweri* | | Sensitive | S3B |
| Burrowing Owl | *Athene cunicularia* | | Sensitive | S3B |
| Chestnut-collared Longspur | *Calcarius ornatus* | | Sensitive | S2B |
| Ferruginous Hawk | *Buteo regalis* | | Sensitive | S3B |
| Golden Eagle | *Aquila chrysaetos* | | Sensitive | S3 |
| Great Gray Owl | *Strix nebulosa* | | Sensitive | S3 |
| Greater Sage-Grouse | *Centrocercus urophasianus* | Candidate | Sensitive | S2 |
| Harlequin Duck | *Histrionicus histrionicus* | | Sensitive | S2B |
| Loggerhead Shrike | *Lanius ludovicianus* | | Sensitive | S3B |
| Long-billed Curlew | *Numenius americanus* | | Sensitive | S3B |
| McCown's Longspur | *Calcarius mccownii* | | Sensitive | S3B |

| Common Name | Scientific Name | Federal Listing | Status[1] BLM Listing | State Listing |
|---|---|---|---|---|
| Mountain Plover | *Charadrius montanus* | | Sensitive | S2B |
| Northern Goshawk | *Accipiter gentilis* | | Sensitive | S3 |
| Peregrine Falcon | *Falco peregrinus* | DM | Sensitive | S3B |
| Red-headed Woodpecker | *Melanerpes erythrocephalus* | | Sensitive | S3B |
| Sage Thrasher | *Oreoscoptes montanus* | | Sensitive | S3B |
| Sprague's Pipit | *Anthus spragueii* | Candidate | Sensitive | S3B |
| Swainson's Hawk | *Buteo swainsoni* | | Sensitive | S4B |
| Whooping Crane | *Grus americana* | LE | Special Status | S1M |
| **Fish** | | | | |
| Northern Redbelly x Finescale Dace | Phoxinus eos x phoxinus neogaeus | | Sensitive | S3 |
| Sauger | *Sander canadensis* | | Sensitive | S2 |
| Yellowstone Cutthroat Trout | *Oncorhynchus clarkii bouvieri* | | Sensitive | S2 |
| **Amphibians** | | | | |
| Great Plains Toad | *Bufo cognatus* | | Sensitive | S2 |
| Northern Leopard Frog | *Rana pipiens* | | Sensitive | S1 |
| Plains Spadefoot | *Spea bombifrons* | | Sensitive | S3 |
| **Reptiles** | | | | |
| Greater Short-horned Lizard | *Phrynosoma hernandesi* | | Sensitive | S3 |
| Milksnake | *Lampropeltis triangulum* | | Sensitive | S2 |
| Snapping Turtle | *Chelydra serpentina* | | Sensitive | S3 |
| Spiny Softshell | *Apalone spinifera* | | Sensitive | S3 |
| Western Hog-nosed Snake | *Heterodon nasicus* | | Sensitive | S2 |

**Note:**
Source: Montana Natural Heritage Program (MTNHP 2009)

[1] **LE** - **Listed endangered:** Any species in danger of extinction throughout all or a significant portion of its range (16 U.S.C. 1532(6)).

**LT - Listed threatened:** Any species likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range (16 U.S.C. 1532(20)).

**DM** - **Recovered, delisted, and being monitored:** Any previously listed species that is now recovered, has been delisted, and is being monitored.

**XN** - **Nonessential population:** An experimental population of a listed species reintroduced into a specific area that receives more flexible management under the Act.

**C - Candidate:** Those taxa for which sufficient information on biological status and threats exists to propose to list them as threatened or endangered. We encourage their consideration in environmental planning and partnerships; however, none of the substantive or procedural provisions of the Act apply to candidate species.

**PS - Partial status:** Status in only a portion of the species' range. Typically indicated in a "full" species record where an infraspecific taxon or population, that has a record in the database has ESA status, but the entire species does not.
**PS:Value** - **Partial status:** Status in only a portion of the species' range. The value of that status appears in parentheses because the entity with status is not recognized as a valid taxon by Central Sciences (usually a population defined by geopolitical boundaries or defined administratively, such as experimental populations).
**PS:C. - Partial Status – Candidate**: Designated as a Candidate in the Western US Distinct Population Segment (DPS) (subspecies *occidentalis*).
**Sensitive -** Denotes species listed as sensitive on BLM lands.
**Special Status** - Denotes species listed as endangered or threatened under the ESA.

Montana Species of Concern are defined as vertebrate animals with a state rank of S1, S2, or S3. Vertebrate species with a rank indicating uncertainty (SU), a "range rank" extending below the S3 cutoff (e.g., S3S4), or those ranked S4 for which there is limited baseline information on status are considered Potential Species of Concern. Because documentation for invertebrates is typically less complete than for vertebrates, only those ranked S1 or S2 are included as SOC. Invertebrates with a range rank extending below S2 (e.g., S2S3) are included as SOC only if their global ranks are G2G3 or G3, or if experts agree their occurrence in Montana has been adequately documented. Other invertebrates of concern with global ranks other than G1, G2, or G3 and with state ranks below S2 or range ranks extending below S2 (e.g., S3S4) are treated as Potential Species of Concern. Rank definitions and qualifiers are as follows:

- Rank Definition
  - **S1** At high risk because of **extremely limited** and/or **rapidly declining** population numbers, range, and/or habitat, making it highly vulnerable to global extinction or extirpation in the state.
  - **S2** At risk because of **very limited** and/or **potentially declining** population numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.
  - **S3** Potentially at risk because of **limited** and/or **declining** numbers, range, and/or habitat, even though it may be abundant in some areas.
  - **S4** Apparently secure, though it may be quite rare in parts of its range, and/or suspected to be declining.
- Qualifiers
  - **B Breeding** - Rank refers to the breeding population of the species in Montana. Appended to the state rank, *e.g. S2**B**,S5N = At risk during breeding season, but common in the winter*
  - **M Migratory** - Species occurs in Montana only during migration.

## 3.7.3.5 Mammals

### 3.7.3.5.1 Black-Tailed Prairie Dog (BLM Sensitive)

The USFWS recently evaluated the status of the black-tailed prairie dog and determined that listing the black-tailed prairie dog as either threatened or endangered is not warranted at this time (Federal Register /Vol. 74, No. 231 / 12- 3-09 ). Ongoing threats are: (1) conversion of native prairie habitat to cropland;(2) urbanization;(3) oil, gas, and mineral extraction;(4) habitat loss caused by loss of prairie dogs; and(5) livestock grazing, fire suppression, and weeds.

According to the Montana Prairie Dog Working Group (2002), the black-tailed prairie dog population in Montana is fragmented, and prairie dogs have been extirpated from local areas such as Richland County, most of Carter County, and portions of other counties. Despite this reduction in prairie dog distribution, the state still has substantial numbers of black-tailed prairie dogs.

In the planning area, black-tailed prairie dogs occur in grassland habitats. The potential exists for increased prairie dog populations based on the amount of grassland habitat available. Grasslands cover approximately 12,159,081 acres (all ownerships) or about 47 percent of the area. There are 166 known prairie dog towns in the planning area; 69 (41.6 percent) of which occur on public lands (Table 3-27). Long term trends in prairie dog abundance in the area are unknown.

**Table 3-27 Black-tailed Prairie Dog Acreage in the Planning Area**

| Year/Source | BLM | State | Private / Other | National Wildlife Refuges | Total |
|---|---|---|---|---|---|
| 2004 Survey | 7,098 | 3,364 | 15,412 | 1,399 | 27,273 |
| % of Total Acreage | 26% | 12% | 57% | 5% | 100% |

### 3.7.3.5.2 White-Tailed Prairie Dog (BLM Sensitive)

The USFWS reviewed a petition to list the white-tailed prairie dog under the ESA and determined that listing is not warranted at this time (Federal Register / Vol. 75, No. 104 / June 1, 2010).

White-tailed prairie dogs generally are found in desert grassland and shrub grassland habitats with moderate slopes at altitudes ranging between 5,000 and 10,000 feet. White-tailed prairie dogs are susceptible to rapid population declines resulting from flea-borne sylvatic plague. In addition, historic and current activities, including shooting, poisoning, and habitat conversion have affected white-tailed prairie dog populations. White-tailed prairie dog towns occur only in southern Carbon County. There has been a noticeable decline in white-tailed prairie dog towns from the 1970s to the early 2000s as illustrated in Table 3-28 below. Definite reasons for the decline are unknown, although it is speculated that sylvatic plague has been the primary cause.

White-tailed prairie dog towns located during surveys from 1975-1977 and in 2003 and 2005 are shown in Table 3-28. The list for each survey year is in no particular order.

**Table 3-28 White-tailed Prairie Dog Acreage in the Planning Area**

| Colony ID | Colony* Size | | |
|---|---|---|---|
| | 1975-1977 (acres) | 2003 (acres) | 2005 (acres) |
| 1 | 5 – 10 | 40.5 | 40 |
| 2 | 2 | 13 | 12 |
| 3 | 74 – 84 | 15 | 23 |
| 4 | 20 | 22.5 | 10 |
| 5 | Undocumented | 18.5 | 18.5 |
| 6 | 2.5 | 10 | 14.6 |
| 7 | 69 – 99 | — | 4.2 |
| 8 | 10 – 20 | — | 72 |
| 9 | 79 | — | 6 |
| 10 | 49 – 79 | — | 53 |
| 11 | 39.5 – 59 | — | — |
| 12 | 2.0 – 9 | — | — |
| 13 | 2.5 | — | — |
| 14 | 1 – 2.5 | — | — |
| 15 | 2.5 – 10 | — | — |
| Total Colonies<br>Total Acres | 15 colonies<br>692 | 6 colonies<br>120 | 10 colonies<br>253 |

**Note:**
*"Colony" is used interchangeably with "town" when referring to prairie dog locations and size.
Sources: 1984 RMP and Backlog Consultation dated May 8, 2008 with the USFWS.

### 3.7.3.5.3 Gray Wolf (Federally Delisted and BLM Sensitive)

On April 2, 2009, the final rule was published that identified the Northern Rocky Mountain population of gray wolf (*Canis lupus*) as a distinct population segment (DPS) and to revise the List of Endangered and Threatened Wildlife by removing most of the gray wolves in the DPS. This rule complies with that directive. This action is effective May 5, 2011. (**Federal Register** / Vol. 76, No. 87 / Thursday, May 5, 2011). Currently, the gray wolf population is managed by Montana Fish, Wildlife, and Parks.

The gray wolf is present in the planning area and is discussed because of its presence on public lands. Two identified wolf packs occasionally range onto public lands along the Beartooth Mountain front**.**

#### 3.7.3.5.4 Grizzly Bear (Listed Threatened)

Grizzly bears prefer remote forest habitats with low road density and minimum human disturbance (Map 21 – Grizzly Bear Habitat). The planning area is not in a grizzly bear Recovery Zone, as designated by the USFWS in the 1993 Grizzly Bear Recovery Plan (USFWS 1993); however the perimeter of the grizzly bear range is adjacent to public lands along the Beartooth Mountain foothills. Grizzly bears may be present as migrants throughout the planning area. A 10-year-old male grizzly bear with a history of killing livestock was euthanized after it was captured for killing cattle southeast of Red Lodge, Montana. The 400-pound bear was caught in a culvert trap Friday, September 9, 2011, on the Sunlight Ranch near the upper forks of the Bear Creek Basin. There are BLM managed public lands in this area. (http://billingsgazette.com/news/state-and-regional/montana/article_49387a6c-de3b-11e0-9d9e-001cc4c002e0.html#ixzz1YVmiUBz7)

#### 3.7.3.5.5 Lynx (Listed Threatened)

Canada lynx are classified as a furbearer in Montana; however, currently there is no trapping season for them. In Montana, lynx are found in mountain and forest regions. East of the Continental Divide the subalpine forests inhabited by lynx occur at higher elevations (5,413 to 7,874 feet) and are mostly species of fir. Secondary habitat is intermixed Englemann spruce and Douglas-fir with lodgepole pine as a major seral species (Ruediger et al. 2000). Throughout their range, shrub-steppe habitats may provide important linkage habitat between the primary habitats described above (Ruediger et al. 2000).

There have been no Lynx Analysis Units designated on public lands in the planning area. However, there is some potential habitat above the 6,000 foot elevation in the Meeteetse Spires and Pryor Mountain areas adjacent to the USFS lands. Only lynx linkage habitat areas are identified on Map 22 – Lynx Habitat.

#### 3.7.3.5.6 Black-footed Ferret (Listed Endangered)

The black-footed ferret was listed as an endangered species in 1967, under a precursor to the Endangered Species Act (ESA 1973). The main causes of the species decline included habitat conversion for farming, intentional efforts to eliminate prairie dogs and disease (USFWS 2000). Black-footed ferrets depend almost exclusively on prairie dog colonies for food, shelter, and denning (Henderson et al. 1969, Forrest et al. 1985).

Historically, black-footed ferrets ranged throughout the non-mountainous portion of Montana in areas that supported prairie dogs, their primary prey. The black-footed ferret was thought to be extirpated from virtually its entire range by the 1970s due to habitat loss, prairie dog eradication, disease, and shooting. The species now exists at 17 reintroduction sites across 8 States, Canada, and Mexico (2 of the 19 reintroduction sites no longer have a ferret population) http://www.fws.gov/mountain-prairie/species/mammals/blackfootedferret/ Last updated: April 5, 2011. Reintroduced populations do not occur in the planning area; the closest populations are in the Northern Cheyenne Indian Reservation. As shown in Table 3-27 and Table 3-28, prairie dog town concentrations or complexes large enough to support black-footed ferret populations are not currently present in the planning area. The largest concentrations of prairie dog towns

exist in Wheatland County, Montana. Additionally, black-footed ferrets are not documented in this area.

#### 3.7.3.5.7 Wolverine (BLM Sensitive)

Wolverines occur in coniferous forests in the planning area. There is the potential for wolverines to utilize the planning area, especially large, contiguous areas.

#### 3.7.3.5.8 Bats

The Pryor Mountains support the most diverse bat fauna in Montana. Ten bat species are known to be present, and additional species are possible (Hendricks et al., 2004).

##### Townsend's Big-eared Bat (BLM Sensitive)

The occurrence of Townsend's big-eared bat has been documented in Montana and the planning area. Townsend's big-eared bats were captured at two caves in the Pryor Mountains and a new bluff site in the Bull Mountains (Hendricks et al., 2004).

##### Spotted Bat (BLM Sensitive)

Spotted bat vocalizations were recorded at eight nesting sites in the Pryor Mountains and at one location in the Bull Mountains (Hendricks et al., 2004). There is only one other location documented in Montana (MFG, 2011).

The most immediate management action that can benefit this species (and other bat species as well) is protection of water sources in arid regions where this bat is present and water sources are limited. Open waste sumps, and similar hazardous standing water bodies associated with oil and gas fields, could present a significant hazard to Pallid Bats and other bat species as these energy resources are exploited (MFG, 2011).

##### Pallid Bad (BLM Sensitive)

A pallid bat was captured at a site along the base of the Pryor Mountains where the species was first discovered in Montana in 1978 (Hendricks et al., 2004). There is one other location documented in Montana in Rosebud County (MFG, 2011).

#### 3.7.3.5.9 Meadow Jumping Mouse (BLM Sensitive)

Small mammal surveys have not been conducted in the BIFO. The meadow jumping mouse prefers areas of dense cover in mesic habitats, such as along stream and marshes. Specimens have been collected in Big Horn County, Montana (Foresman, 2001).

#### 3.7.3.5.10 Birds

##### Bald Eagle (BLM Sensitive)

Since the federal delisting of the bald eagle on July 9, 2007 (USFWS, 2007), the species continues to be protected under the Bald and Golden Eagle Protection Act. Bald eagles are large, primarily fish eating raptors, although they also consume waterfowl and carrion. Bald eagles nest and roost near large bodies of water, including lakes, reservoirs, and large rivers.

Nest and winter roost sites typically are located in large trees adjacent to water. Bald eagles commonly nest along the Yellowstone, Clarks Fork, and Stillwater rivers in the planning area.

There is one nest site on BLM lands in the planning area. This nest site is the Nibbe bald eagle nest territory, near Pompeys Pillar, upriver from Bundy Bridge. According to MTFWP and BLM maps, there are 10 nest sites along the Yellowstone, Clarks Fork of the Yellowstone, and Stillwater rivers adjacent to or in one mile of BLM lands. Additionally, short term concentrations of up to 100 bald eagles have been documented at Pompeys Pillar.

### Whooping Crane

The whooping crane was listed as an endangered species in 1967, under a precursor to the ESA (1973). The main cause of the species decline was conversion of pothole and prairie habitat for agriculture and shooting. Current threats to wild cranes include collisions with manmade objects such as power lines and fences, shooting, predators, disease, habitat destruction, severe weather, and a loss of two thirds of the original genetic material.

Whooping cranes are not known to breed in the planning area or any other portion of Montana. Whooping cranes from the Aransas-Wood Buffalo NP occur as transient/migrant species known to fly through Montana during both spring and fall migrations. The planning area is located on the extreme western edge of the central migration pathway. Data on whooping cranes in the state is limited. There were no sightings from 1996-2002, and the only historic sighting prior to 1991 was on the very eastern edge of the planning area (Lenard, S. et al., 2003). Bird sightings have generally been in marshy areas and grain and stubble fields as well as wet meadows and wet prairie habitat (Montana Field Guide 2009).

### Mountain Plover (BLM Sensitive)

The mountain plover is associated with shortgrass prairie/grasslands (especially those that are heavily grazed and are on level or gently sloping areas), and they regularly occupy prairie dog towns. Intensive grazing is thought to be beneficial to the birds because they prefer areas with extremely short vegetation and a high percentage of bare soil. Records indicate that mountain plovers have declined in abundance in Montana over the past century, possibly due to increased irrigated agriculture and/or prairie dog control (Montana Field Guide 2009). Limited mountain plover surveys have been conducted in the planning area; however, it has been documented that mountain plovers are nesting in the shortgrass prairie in the foothills south of the Snowy Mountains. In addition, breeding has been documented in southern Carbon County (FaunaWest Wildlife Consultants, 2006).

### Long-billed Curlew (BLM Sensitive)

Long-billed curlews are found across Montana between March and September. Putnam and Kennedy (2005) identify shortgrass prairie, mid-grass prairie, sage-steppe, and prairie potholes as preferred breeding habitats in the state. Long-billed curlews prefer expansive, open, level to gently sloping or rolling grasslands with short vegetation, such as shortgrass or recently grazed mixed-grass prairie. During migration, birds use agricultural fields, grazed pastures, wetlands, and mudflats (Fellows and Jones, 2009).

Observations of long-billed curlews in the field office have been more prevalent in the short grass prairie areas in the foothills of the Snowy and Little Belt Mountains. These areas have only scattered tracts of public land and are mostly private lands.

Conservation concerns include habitat loss (sod busting, weed invasion, general conversion of prairie land to other uses), breeding habitat in the state that is either fragmented, unprotected, or mismanaged, and/or human directed disturbance to grassland habitats (impacts of cattle grazing, roads, and adjacent land activities, pesticide application, and draining of wetlands) (Montana Comprehensive Fish and Wildlife Conservation Strategy 2005).

### Greater Sage Grouse (BLM Sensitive)

On March 5, 2010, the USFWS determined that the greater sage grouse was to be listed as warranted, but precluded by other higher priority species, and therefore is a Candidate species under the ESA.

Greater sage grouse use a variety of shrub-steppe habitats throughout their life cycle and are considered obligate users of several sagebrush species (USFWS 2005). Nest sites are generally under sagebrush cover. In the early brood rearing period, birds remain near the nest site and typically move to moist habitats (riparian areas, wet meadows) during the late brood rearing period. During winter, the birds rely exclusively on sagebrush for forage and cover. In the state of Montana, the greater sage-grouse population declined sharply from 1991 to 1996, then increased through 2000 (Montana Sage Grouse Working Group 2004). Primary ongoing threats to greater sage-grouse include loss, fragmentation, and deterioration of habitat from such factors as the spread of noxious weeds, infrastructure development, oil and gas (O&G) development, wildfire, and conifer invasion (USFWS 2005). Wildfire has been the largest factor affecting habitat loss in the planning area. All other factors are minor when acreage affected is considered on BLM lands. Private lands have been more affected from habitat conversion through dryland farming whereas BLM lands are not affected. Rangeland allotment boundary and pasture fences have caused some mortality of sage grouse where they were located near lek sites and habitat. Data is not available, although it should be analyzed in the future, to identify priorities for marking problem fences.

The planning area includes approximately 3.68 million acres (all ownerships) of greater sage-grouse habitat and 19 known active lek sites, including approximately 336,000 acres (nine percent) on BLM public lands (Table 3-29).

**Table 3-29 Greater Sage Grouse Habitat and Lek Sites in the Planning Area**

| Habitat/Distribution | BLM | State | Private | Other Miscellaneous | Total |
|---|---|---|---|---|---|
| Total occupied habitat (acres): | 336,479 | 219,199 | 3,078,179 | 53,223 | 3,687,080 |
| **Number of known active lek sites | 19 (27 total; 8 inactive) | 11 (15 total; 4 inactive) | 220 | 3 | 265 |

**Note:**
* Acreage data derived from draft habitat maps from MTFWP.
**Lek site data is from MTFWP.

BLM public lands comprise 9 percent of the total occupied greater sage-grouse habitat in the planning area. Using long term averages of male counts on 20 leks from 1981-2007, the average male count was 672. The 2008 count was 19.5 percent below the long term average or about 542 males. Other BLM GIS data indicate that the planning area contains 265 known active greater sage-grouse lek sites. On public lands, there are 19 active and 8 inactive (27 total) lek sites. Public lands comprise 7 percent of the total leks in the planning area.

There are 30 lek sites on Federal mineral estate. According to the Reasonable Foreseeable Development (RFD) scenario for oil and gas development, there are 103 leks in Moderate Potential development areas and 122 leks in Low Potential development areas (Map 124).

Sage grouse core areas are designated by MTFWP. BLM designated Priority Protection, Restoration, and General Habitat Areas (PPAs, RPAs, and General) with consideration for several factors such as, core or key area designations, lek sites, population densities, habitat suitability, habitat disturbances, habitat fragmentation, and land ownership (Map 168 – Greater Sage-Grouse Habitat Core Areas). Please refer to the Glossary for descriptions of the three Sage Grouse Habitat areas.

Within the sage grouse core areas, there are 191,543 acres of Federal minerals (154,140 acres BLM surface). Outside of the MTFWP core areas, there are 179,889 acres of Federal minerals (124,130 acres BLM surface), and 116,452 acres of Federal minerals.

Montana Audubon and the National Audubon Society have identified two Important Bird Areas (IBAs) in the planning area. Musselshell and Bridger sage-steppe areas are 3.060,736 and 358,302 acres respectively. The Bridger sage-steppe area is entirely in Carbon County and the Musselshell IBA has acreage in Musselshell and Golden Valley counties in the field office area and four other counties outside of the field office area. The IBAs were identified to accentuate the management of these areas for the conservation of sage grouse and other sagebrush obligate species. Refer to: http://www.mtaudubon.org/birds/sageiba.html .

The range of the greater sage-grouse in North America has been divided into seven sage-grouse management zones based on populations within floristic provinces (Stiver et. al. 2006). The floristic provinces are areas within which similar environmental factors influence vegetation communities (Knick and Connelly 2011). The Billings Field office is bisected by two greater sage-grouse management zones; the Great Plains Management Zone (MZ1) and the Wyoming Basins Management Zone (MZ2). Most of the planning area lies within MZ1; however the majority of the sage-grouse habitat managed by the BLM in the planning area lies within the extreme northern portion of MZ2. See Figure 3-10). The following discussion of the landscape context of the planning area related to greater sage-grouse describes MZ1 since that is where the majority of the planning area is located and the issues and descriptions of MZ1 are mostly the same as those that would be described for the northern portion of MZ2 found in the planning area.

Greater sage-grouse habitats in Management Zone 1 (MZ1) were historically a function of the interaction of physical factors (e.g., climate, soils, geology, and elevation), and natural disturbance factors (e.g., fire, grazing, drought) that allowed sagebrush to persist on the

landscape. These physical and natural factors combined to produce an interspersion and juxtaposition of different habitats that included large expanses of sagebrush patches favorable for greater sage-grouse occupation. The sagebrush species associated with greater sage-grouse habitat in MZ1 is primarily Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*). Other shrubs present may include basin big sagebrush (*Artemisia tridentata ssp. tridentata*), silver sagebrush (*Artemisia cana*), greasewood (*Sarcobatus vermiculatus*), saltbush (*Atriplex* species), rubber rabbitbrush (*Ericameria nauseosa*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and antelope bitterbrush (*Purshia tridentata*) and overall shrub cover is less than 10 percent (Montana Field Guide 2011). Perennial herbaceous components typically contribute greater than 25% vegetative cover and consist mostly of rhizomatous and bunch-form grasses, with a diversity of perennial forbs (Montana Field Guide 2011). The dominant grass in this system is western wheatgrass (*Pascopyrum smithii*) and sites may include other species such as Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*),Sandberg's bluegrass *(Poa secunda*), or bluebunch wheatgrass (*Pseudoroegneria spicata*) (Montana Field Guide 2011). Dryland sedges such as threadleaf sedge (*Carex filifolia)* and needleleaf sedge (*Carex duriuscula*) are very common and important in the eastern distribution of this system in Montana and Wyoming (Montana Field Guide 2011). Common forbs include Hood's phlox (*Phlox hoodii*), sandwort (*Arenaria* species), prickly pear (*Opuntia* species), scarlet globemallow (*Sphaeralcea coccinea*), purple prairie clover (*Dalea purpurea*), gayfeather (*Liatris punctata*), and milkvetch (*Astragalus* species) (Montana Field Guide 2011). Big sagebrush is easily killed by fire at all intensities, and when exposed to fire, plants do not resprout (Wright et al. 1979). In southwestern Montana, Wambolt and others (2001) found that fire in big sagebrush is stand replacing, killing or removing most of the aboveground vegetation, and that recovery to pre-burn cover (of sagebrush) takes at least 20 years. In Montana, Wyoming big sagebrush may require a century or longer to recover from fire (Lesica et al. 2005). Big sagebrush occurs on level to gently rolling plains, plateaus, sideslopes and toeslopes, and as small and large patches in dissected landscapes such as breaks (Montana Field Guide 2011).

Land ownership throughout MZ1 is predominantly private (70%). Ownership of the remaining range of the greater sage-grouse in MZ1 is 68% private and 13% state or other federal ownership (not including the Fort Peck and Fort Belknap Indian Reservations), with 83% of the federal lands in the range of greater sage-grouse in MZ1 managed by BLM.

Sage-grouse populations have declined in portions of MZ1 through wholesale loss of habitat as well as through impacts to birds on the remaining habitat through disturbance and direct mortality. The most pervasive and extensive change to the sagebrush ecosystems in MZ1 is the conversion of nearly 60% of native habitats to agriculture (Samson et al. 2004). The conversion was facilitated by the Homestead Act of 1862 in the United States and the Canada Dominion Act of 1872 (Knick 2011). Under the Homestead Act, nearly 1.5 million people acquired and plowed over 309,000 sq. mi. (800,000 $km^2$) of land, primarily in the Great Plains (Samson et al. 2004). The impacts of land conversion in the late 1800s and early 1900s were probably greatest for sagebrush habitats nearest perennial water sources in MZ1.

Much of the direct habitat loss from conversion to agriculture has occurred primarily in the far northwestern and northeastern portions of the management zone (Knick et al. 2011). Cropland currently cover nearly 19% of the MZ and 91% of the MZ is within 6.9 km of cropland (Knick et al. 2011) (Figure 3-11). Recent interest in bio-fuel production and high prices for small grains has resulted in an increase in the conversion of native grasslands or lands formerly enrolled in the Conservation Reserve Program (CRP) to cropland, further emphasizing the importance of BLM lands and associated private lands managed for grazing to maintain large blocks of native grassland and shrubland habitats.

Converting native grasslands to agricultural lands not only resulted in a direct loss of habitats for native wildlife, it began a process of habitat fragmentation. Habitat loss is exacerbated when fragmentation reduces the size and/or isolates remaining habitat patches below the size thresholds necessary to support components of biological diversity or blocks the movement of animals between habitat patches. As large contiguous blocks of habitat are dissected into smaller blocks, they became more isolated from one another by dissimilar habitats and land uses. Adverse impacts from fragmentation can occur to individual plant and animal species and communities. The impacts of habitat fragmentation to biological resources can occur on multiple scales and can vary by species and the type of fragmentation. Individual species have different thresholds of fragmentation tolerance; greater sage-grouse (*Centrocercus europhasianus*) have large spatial requirements and eventually disappear from landscapes that no longer contain large enough patches of habitat while smaller birds like the Sprague's pipit (*Anthus spragueii*) can persist in landscapes with smaller patches of habitat because their spatial requirements are smaller.

Changes in vegetation can also result in the loss and fragmentation of native habitats. The conversion of large acreages of sagebrush to predominately grassland communities results in the direct loss of sagebrush habitat and can also fragment remaining habitat for sagebrush-dependent species, such as the greater sage-grouse. Roads and OHV use can promote the spread of noxious weeds through vehicular traffic and noxious weed infestations can further exacerbate the fragmentation effects of roadways. Irrigation water has also supported the conversion of native plant communities to hayfields, pasture, and cropland, thereby fragmenting sagebrush habitats. Excessive grazing can result in the demise of the most common perennial grasses in this system and lead to an abundance cheatgrass or Japanese brome (Montana Field Guide 2011).

The remaining sagebrush habitats in MZ1 are mostly managed as grazing lands for domestic livestock. Domestic livestock function as a keystone species in the MZ through grazing and management actions related to grazing. These actions do not preclude wildlife and vegetation, but they do influence ecological pathways and species persistence (Bock et al. 1993). The effects of grazing on sagebrush habitats in this management zone are much different than effects noted in the Great Basin since the landscape throughout MZ1 is adapted to withstand grazing disturbance (Knick et al. 2011). Historically large numbers of bison (*Bos bison*) moved nomadically through the MZ in response to changes in vegetation associated with drought, past grazing, and fire. Grazing by bison occurred in large areas as huge herds moved through, and the impacts of these herds on the vegetation, soils, and riparian areas were probably extensive.

The interval between grazing episodes may have ranged from one to eight years (Malainey and Sherriff 1996). Bison were replaced with domestic livestock in the late 1800s. The intensity and duration of grazing in the MZ increased as domestic livestock numbers and annual grazing pressure increased. The high intensity grazing probably increased the density and perhaps the distribution of sagebrush in the MZ particularly when combined with a concurrent reduction in the amount of fire on the landscape. Grazing on public lands was unregulated until the passage of the Taylor Grazing Act in 1934. Since the passage of the Taylor Grazing Act, range conditions have improved due to improved grazing management practices and livestock operations related to decreased livestock numbers and the annual duration of grazing. In addition, the BLM has applied Standards for Rangeland Health since 1997 to enhance sustainable livestock grazing and wildlife habitat while protecting watersheds and riparian ecosystems. However, developments to facilitate grazing management often include elements detrimental to sage-grouse. Perhaps the most pervasive change associated with grazing management in sage-grouse habitats throughout the MZ is the construction of fencing and water developments (Knick et al. 2011) (Figure 3-12). Barbed wire fences contribute to direct mortality of sage-grouse through fence collisions (Stevens 2011) and water developments may contribute to increased occurrence of West Nile Virus in greater sage-grouse (Walker and Naugle 2011). Water developments are particularly prevalent in the north central portion of the MZ (Figure 3-13). Additional habitat modifications associated with grazing management include mechanical and chemical treatments to increase grass production, often by removing sagebrush (Knick et al. 2011).

Other major land uses in the MZ include energy development (primarily oil and gas development), and urbanization and infrastructure. Oil and gas development in the MZ has occurred throughout the MZ but is concentrated in the southern portions (Powder River Basin) the north (Bowdoin Field) and the south and east (Williston Basin) (Figure 3-14). Oil and gas development includes direct loss of habitat from well pad and road construction as well as indirect disturbance effects from increased noise and vehicle traffic. Oil and gas developments directly impact greater sage-grouse through avoidance of infrastructure, or when development affects survival or reproductive success. Indirect effects include changes to habitat quality, predator communities, or disease dynamics (Naugle et al, 2011).

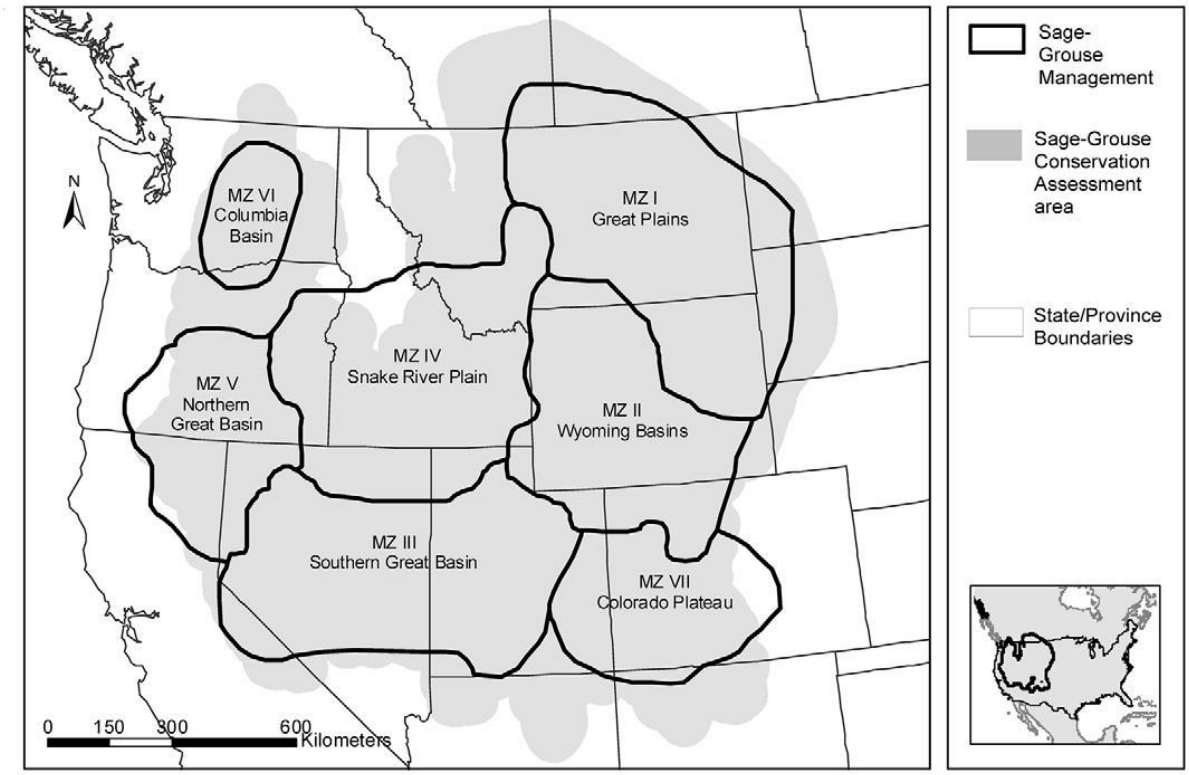
Currently nearly 16% of the MZ is within 3km of oil and gas wells, a distance where ecological effect is likely to occur (Knick et al 2011). Much of the current oil and gas development is occurring on private lands with little or no mitigation efforts, which elevates the ecological and conservation importance of sage-grouse habitat on public lands.

Urbanization and infrastructure development in MZ1 has also impacted greater sage-grouse habitat. Development at population centers and subdivisions or smaller ranchettes and associated buildings, roads, fences, and utility corridors has also contributed to habitat loss and fragmentation in portions of the MZ. Current estimates suggest about 16% of the MZ is within 6.9 km of urban development, although MZ1 generally has lower population densities and lower rates of population increases compared to the other management zones (Knick et al 2011). Infrastructure development effects to greater sage-grouse habitats in MZ1 are primarily related to highways, roads, powerlines and communication towers, with nearly 92% of the MZ

within 6.9km of a road, 32% within 6.9km of a powerline and 4% within 6.9km of a communication tower (Knick et al. 2011) (Figure 3-15). Increased recreation and OHV use on lands in the MZ are also thought to impact greater sage-grouse habitats, but have not been studied (Knick et. al. 2011).

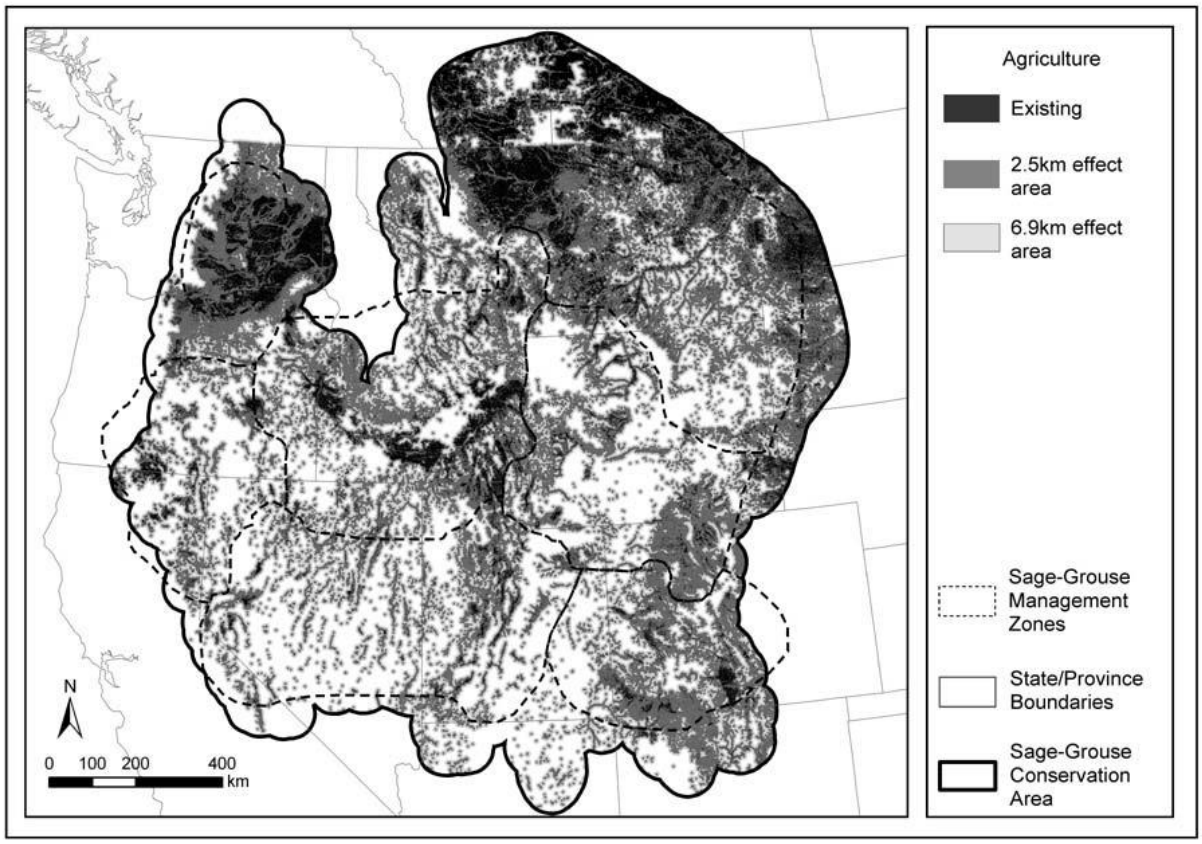
The cumulative and interactive impact of multiple disturbances and habitat loss has influence the current distribution of greater sage-grouse in MZ1. The cumulative extent of human caused changes, the human footprint, on sage-grouse habitat in MZ one is highest at the northern edge of the MZ but occurs throughout the MZ (Leu and Hanser 2011) (Figure 3-16). Population centers for greater sage-grouse in MZ1 (Dohertly et al. 2011) generally correspond to areas lacking a high human footprint and some of these areas have been designated as core areas by Montana Fish, Wildlife, and Parks (Montana Fish, Wildlife and Parks 2010). Greater sage-grouse range in MZ1 is overall very similar to portions of the range where sage-grouse have been extirpated i.e. areas with high human footprints, mostly because of the abundance and distribution of sagebrush in the MZ (Wisdom et al. 2011) suggesting that sage-grouse in MZ1 are more vulnerable to declines than other portions of the sage-grouse range.

**Figure 3-10 Sage-Grouse Management Zones in the Western U.S. and Canada**



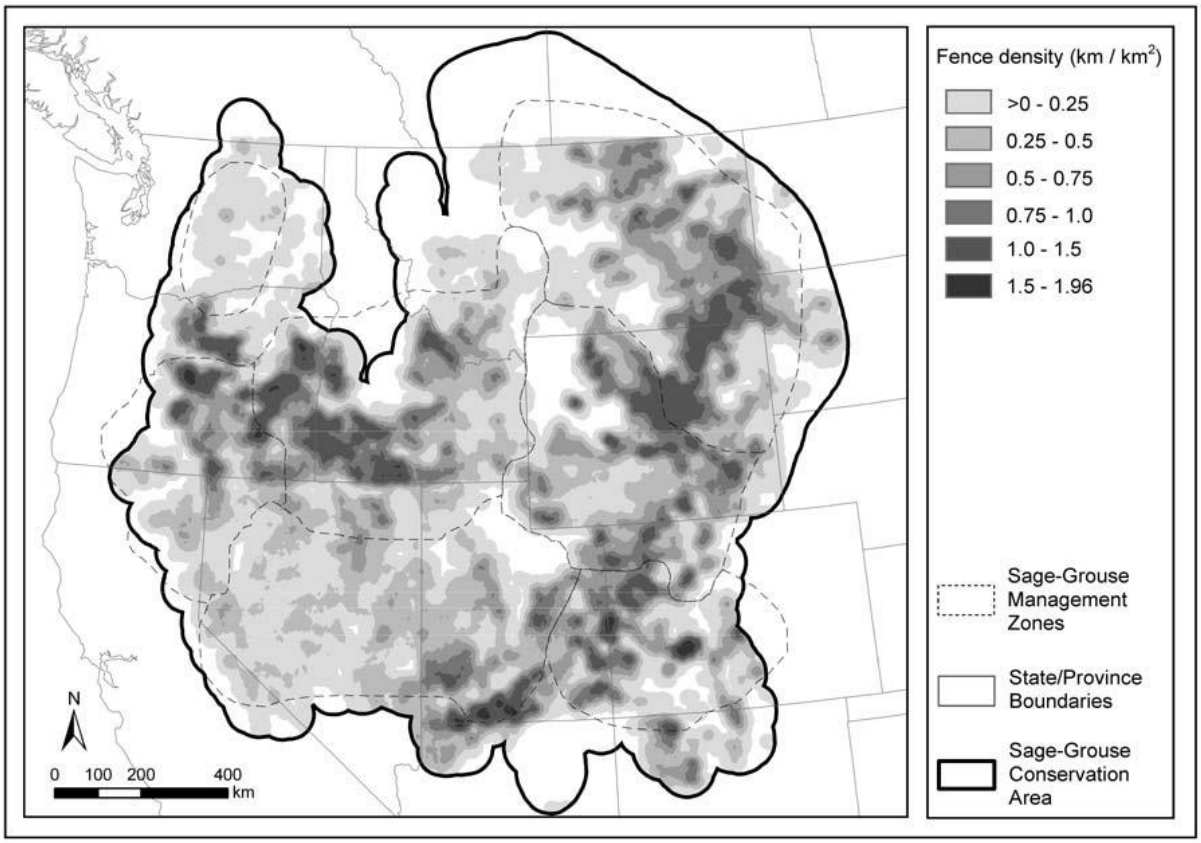

(Western Association of Fish and Wildlife Agencies' Sage-grouse Conservation Planning Framework Team 2006, http://sagemap.wr.usgs.gov/ftp/sab/SG_MgmtZones_ver2_20061018.txt)

**Figure 3-11 Agricultural Lands within the Sage-Grouse Conservation Area**



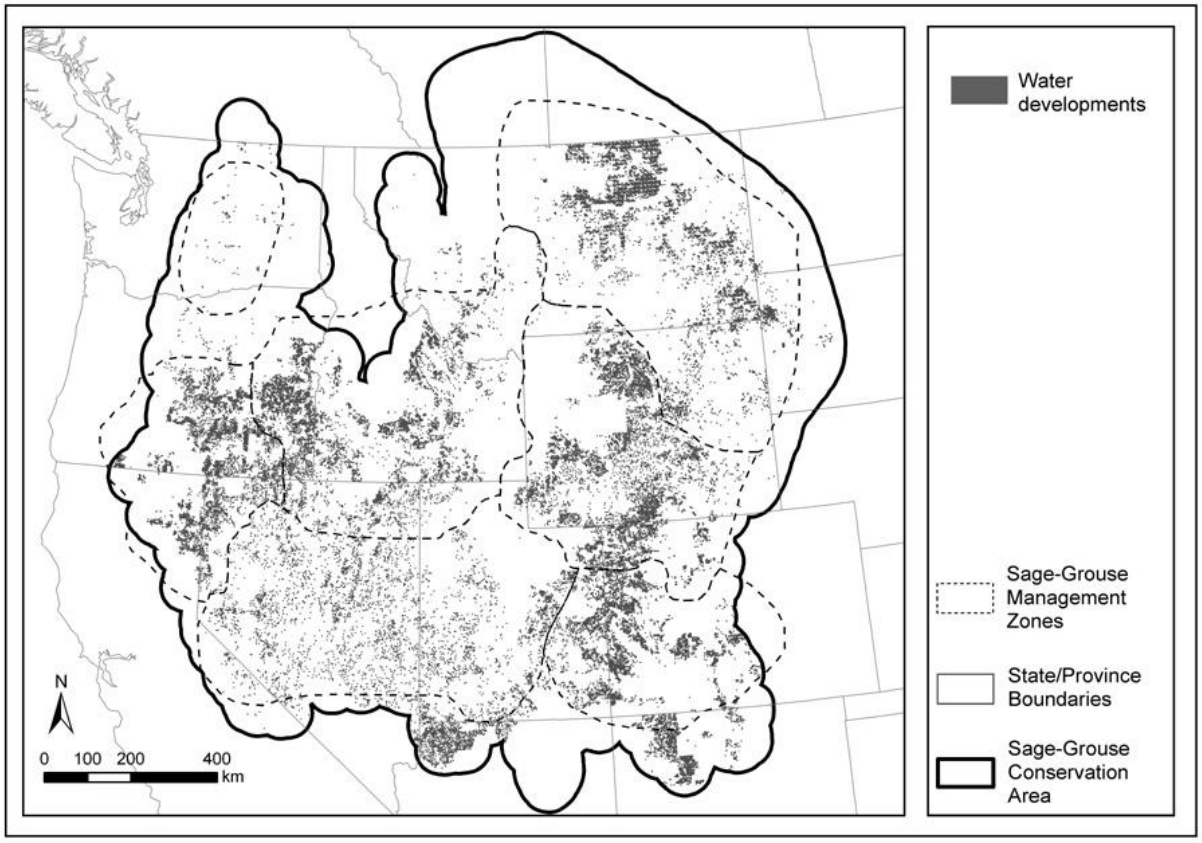

(From Knick et al. 2011). Agricultural lands within the Sage-Grouse Conservation Area. Mapped land cover depicts primarily croplands although pasture was included in the agriculture category (Landfire 2006).

**Figure 3-12 Linear Density of Fences on Public Lands in the Sage-Grouse Conservation Area**



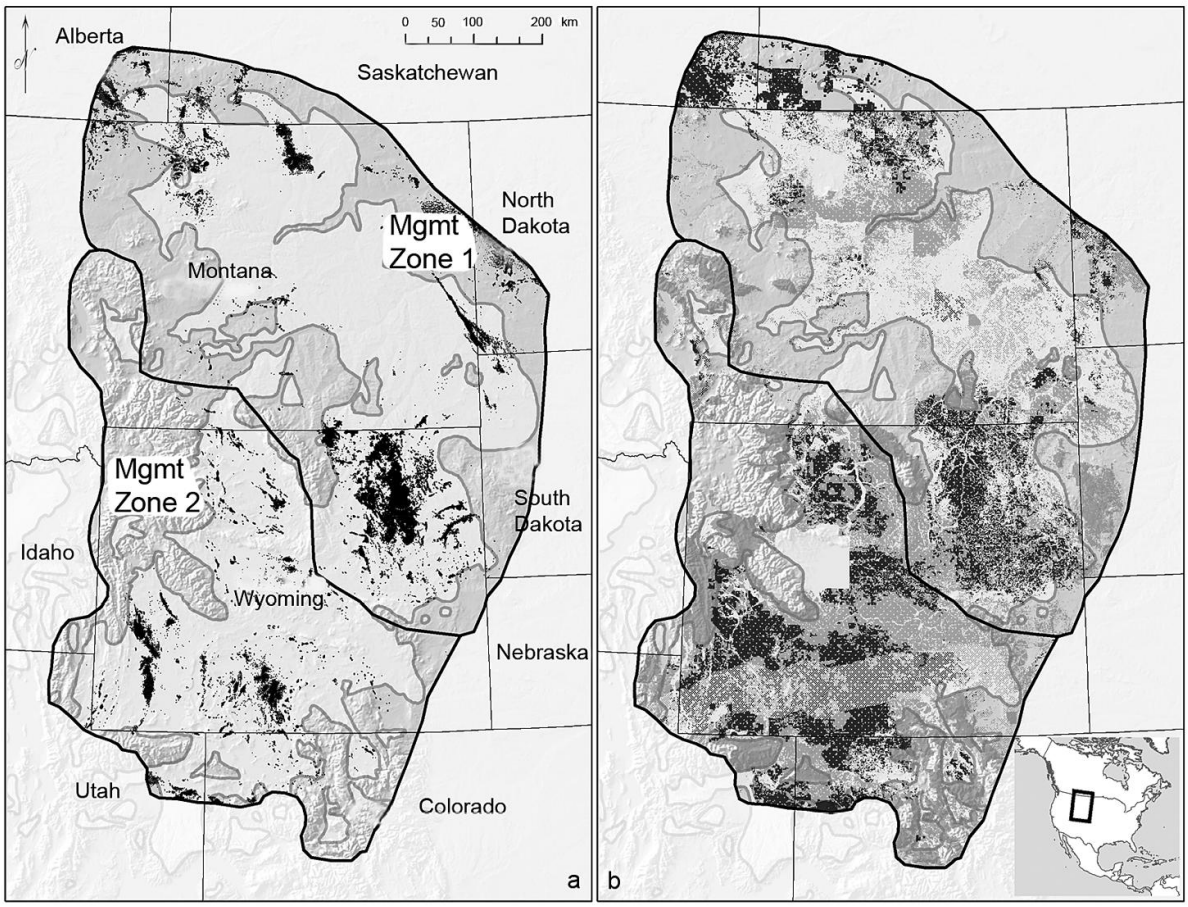

(from Knick et. al. 2011). Linear density (kilometers/kilometers2) of fences (estimated from allotment and pasture boundaries) on public lands in the Sage-Grouse Conservation Area (GIS coverages obtained from United States Bureau of Land Management Geocommunicator).

**Figure 3-13 Water Developments on Lands Managed by the US Bureau of Land Management**



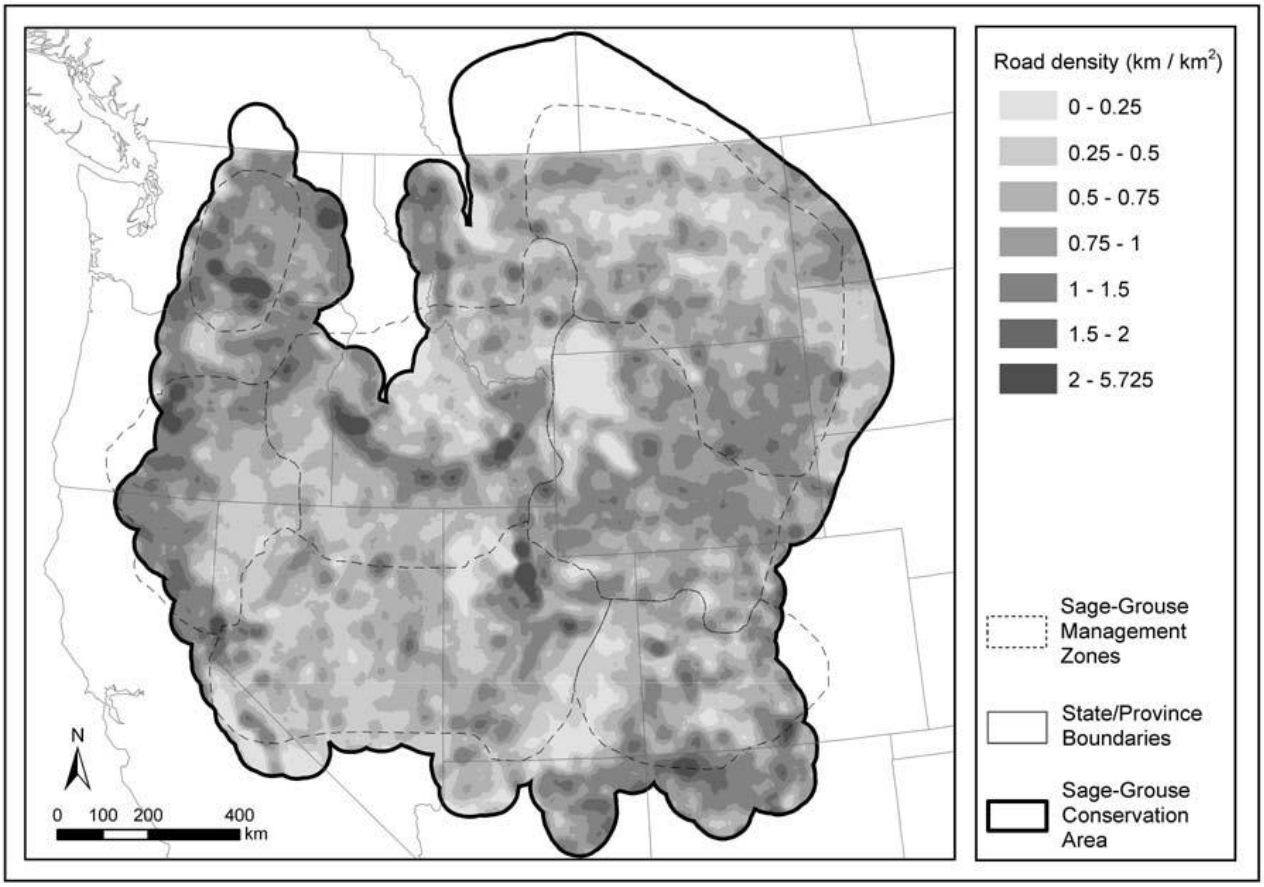

(from Knick et al. 2011). Water developments on lands managed by the US Bureau of Land Management (United States Bureau of Land Management Range Improvement data base). Locations of water development are recorded to the nearest 2.59 km2.

**Figure 3-14 Locations of Producing Oil and Gas Wells within Sage-Grouse Management Zones I and II**



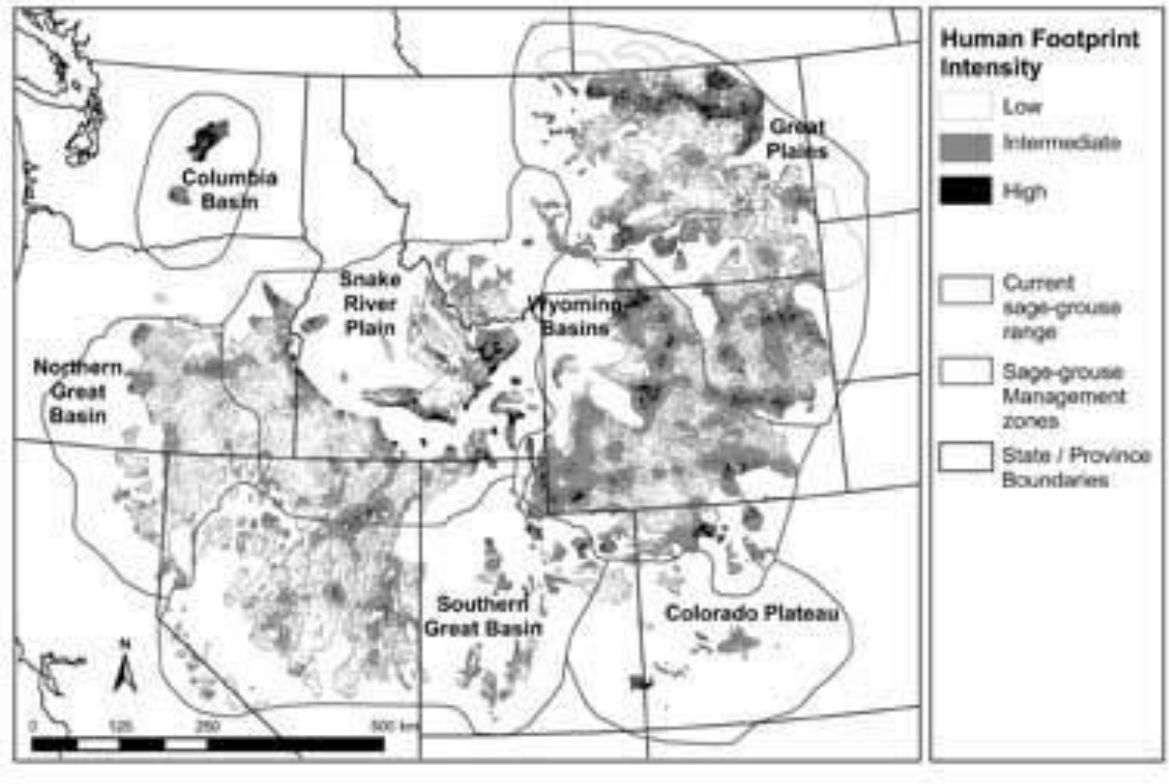

(from Naugle et al 2011). (A). Locations of producing oil and gas wells within sage-grouse management zones I and II (Connelly et al. 2004). Range of Greater Sage-Grouse (Schroeder et al. 2004) within management zones is shown in gray. (B). Federal mineral estate is shown in gray. Authorized leases from the federal mineral estate in the US and Canada are shaded black. Leases were authorized for exploration and development on or before 1 June 2007 for each state except Utah (1 May 2007). Leases in Canada were authorized for development on or before 29 January 2008 in Saskatchewan and 4 April 2008 in Alberta. A swath of authorized leases across southern Wyoming appears lighter in color because mineral ownership is mixed.

**Figure 3-15 Contoured Secondary Roads in the Sage-Grouse Conservation Area**




(From Knick et al. 2011). Contoured secondary roads in the Sage-Grouse Conservation Area (density [kilometers/kilometers2] within an 18-km radius) (GIS coverages obtained from United States Census Bureau).

**Figure 3-16 Spatial extent of Three Human-footprint-intensity Classes for the Conterminous US within the Current Range of Sage-Grouse and Sage-Grouse Management Zones**




(from Leu and Hanser, 2011). Spatial extent of three human-footprint-intensity classes for the conterminous US within the current range of sage-grouse and sage-grouse management zones (Stiver 2006). Human-footprint-intensity classes are low (class 1–3; Leu et al. 2008), intermediate (class 4–6), and high (class 7–10).

## Burrowing Owl (BLM Sensitive)

Burrowing owls are widely distributed east of the Continental Divide in Montana. They are typically associated with open grasslands and commonly use abandoned mammal burrows for nest sites. Burrowing owls are opportunistic feeders and their diet varies seasonally. There are several observations of burrowing owls in the field office that are closely related to the presence of prairie dog towns or ground squirrels. Populations appear to have declined, possibly due to the reduction in prairie dog populations.

## Brewer's Sparrow (BLM Sensitive)

Brewer's sparrows are sagebrush obligate species that prefer sites with high shrub cover and large patch size (Ashley and Stoval 2004). Their open cup shaped nests are typically found in live sagebrush. These sparrows occur in the planning area and were intensively studied in the southern BiFO area and their breeding habitat has been documented (Chalfoun 2006).

### Golden Eagle (BLM Sensitive)

In Montana, golden eagles eat primarily jackrabbits, ground squirrels, and carrion. They sometimes prey on deer and antelope fawns, small mammals, waterfowl, and grouse. Golden eagles nest on cliffs, in large trees, or occasionally on artificial structures such as power poles. Golden eagles are protected by the Bald and Golden Eagle Protection Act (BGEPA). Due to low snow fall levels and open winters in the northern Big Horn Basin, (or southern Carbon County), there is documented evidence of wintering golden eagles in the area. Threats to their populations are disturbance to nests, power pole electrocutions, and secondary lead poisoning from consuming prey shot with lead bullets.

### Chestnut-collared Longspur (BLM Sensitive)

The Montana distribution for chestnut-collared longspurs is east of the Continental Divide on native mixed-grass and tall and shortgrass prairies. Chestnut-collared longspurs arrive on Montana breeding ground in late April and first clutches are initiated in early to mid June. Flocking occurs as nesting ends in mid August, and migration begins in early September. The majority of Montana Natural Heritage Tracker observations are from the northern and western area of the field office with one in Carbon County. Only two to three observations are from public land, with the remaining sightings occurring on private lands.

### Loggerhead Shrike (BLM Sensitive)

Loggerhead shrikes breed throughout much of eastern Montana in a variety of habitats such as grassland prairies with scattered trees, riparian areas, woody draws, or cultivated land with shelterbelts. In Montana grasslands and shrub steppe, loggerhead shrikes tend to select areas with a significant presence of shrubs and forbs (Dechant et al. 1998). Loggerhead shrikes have been documented in the planning area (Lenard et al. 2003).

### McCown's Longspur (BLM Sensitive)

Montana provides a large portion of the available breeding habitat for McCown's longspurs. They can be found throughout Montana, east of the Continental Divide. There is indirect evidence of breeding in northern Musselshell County (Lenard et al., 2003).

### Sage Thrasher (BLM Sensitive)

Sage thrashers are sagebrush obligate, as they are common inhabitants of shrub-steppe communities dominated by big sagebrush. Nest site selection is specific, as most nests are located in or beneath sagebrush plants with high foliage and branch density (MPIF 2000). Dense patches of large sagebrush plants and low densities of exotic plants also seem to be an important habitat characteristic for sage thrashers. Documented breeding habitat occurs in the planning area (Lenard et al. 2003).

### Sprague's Pipit (BLM Sensitive)

In Montana, Sprague's Pipit nest sites were in grasslands primarily with native grasses of intermediate height and density, with little bare ground or clubmoss and few shrubs, and in nest patches with greater litter cover and depth, while avoiding areas with prickly pear cactus cover

(Map 25) (Dieni and Jones 2003). There is indirect evidence of breeding in the northern part of the planning area (Lenard et al., 2003)

### Ferruginous Hawk (BLM Sensitive)

The ferruginous hawk occurs in grassland and shrublands throughout the planning area during the spring, summer, and fall. Ferruginous hawks often nest on the ground, lone trees, topographic high points, or cliffs. They typically occur in areas with abundant prey, most often grassland rodents and lagomorphs (Johnsgard 1990). This species is considered sensitive to disturbance during the nesting period, and nest sites have been documented in Musselshell County.

### Peregrine Falcon (BLM Sensitive)

The peregrine falcon is a mid to large sized falcon associated with a variety of habitats during the spring, summer, and fall seasons. Nesting habitats for this species include cliffs, canyons, or other secure topographic features typically near larger water bodies and an abundant prey base. Peregrine falcons have five known nest sites in the planning area. Three of these sites are on BLM lands. This species was delisted from the federal endangered species list in 1999.

### Northern Goshawk (BLM Sensitive)

The northern goshawk, a large bird of prey is a seasonal migrant in the planning area. Nesting habitats are generally in coniferous forests, and northern goshawks often forage throughout the forest, including aspen stands, meadows, and forest openings. The limited amount of suitable forested areas in the planning area indicates that few nesting northern goshawks are present. No known active nests occur in the planning area.

### Swainson's Hawk (BLM Sensitive)

The Swainson's hawks breeds throughout Montana, generally nesting in river bottom forests, brushy coulees, and shelterbelts. They hunt in grasslands and agricultural areas, especially along river bottoms (Montana Field Guide 2011). Two nest locations were recorded during a raptor survey (Centmont Bioconsultants, 2005).

### Blue-gray gnatcatcher

Breeding habitat in Montana is restricted to open stands of Utah juniper (*Juniperus osteosperma*) and limber pine (*Pinus flexilis*) with intermixed big sage (*Artemisia tridentata*). All nests found have occurred 0.8 to 1.7 meters above ground in Utah juniper or big sage growing on the lower slopes or bottoms of canyons (P. Hendricks unpublished data The northern Bighorn Basin that extends into Carbon County is the northern most extension of their breeding range (MFG, 2011).

Montana Audubon identified an Important Bird Area (IBA) in the planning area at Bear Canyon in the foothills of West Pryor Mountain, near the Wyoming border. The area is four square miles, and the Utah juniper supports breeding populations of more than a dozen species on the Montana Priority Bird Species List. The area also has the highest known number of nesting blue-gray gnatcatchers among the foothill canyons in the area and the only documented

breeding occurrence of blue-gray gnatcatchers in Montana. Refer to:
**http://www.audubon.org/bird/iba** - National Audubon Society.

### Baird's Sparrow (BLM Sensitive)

Baird's Sparrows prefer to nest in native prairie; however structure may ultimately be more important than plant species' composition. Nesting may take place in tame grasses (nesting has been observed in crested wheat, while smooth brome is avoided) (Sutter 1998). This sparrow has also been found to use drier areas during unusually wet years and wet areas during unusually dry years (Casey 2000). Because a relatively complex structure is so important for nesting, areas with little or no grazing activity are required (MFG, 2010.

### Black Tern (BLM Sensitive)

Black Tern breeding habitat in Montana is mostly wetlands, marshes, prairie potholes, and small ponds. However, several breeding locations are on manmade islands or islands in manmade reservoirs. Across all Montana sites where Black Terns are present, approximately 30 percent to 50 percent of the wetland complex is emergent vegetation. Vegetation in known breeding colonies includes alkali bulrushes, canary reed-grass, cattail, sedge, rush, reed, grass, *Polygonum* spp., *Juncus* spp. and *Potamogeton* spp., indicating a wide variety of potential habitats. Water levels in known breeding localities range from about 0.5 m to greater than 2.0 m with most having depths between 0.5 m and 1.0 m (MTNHP 2003; Montana Field Guide [Retrieved on February 4, 2010, from http://FieldGuide.mt.gov/detail_ABNNM10020.aspx]). The only historic breeding records documented in the southern area of the BiFO (Lenard et al., 2003).

### Bobolink (BLM Sensitive)

Nests are built in tall grass and mixed-grass prairies, and this species prefers "old" hay fields with high grass-to-legume ratios (Montana Field Guide, [Retrieved on February 4, 2010 from http://FieldGuide.mt.gov/detail_ABPBXA9010.aspx]). Indirect evidence of breeding in BiFO has also been documented (Lenard et al., 2003).

### Great Gray Owl (BLM Sensitive)

Little specific habitat information for Montana is currently available, as systematic surveys for Great Gray Owls have not been done. Great Gray Owls are, however, known to use lodgepole pine / Douglas-fir as habitat in Montana. Habitat information from other Great Gray Owl sources state that their habitat is dense coniferous and hardwood forest, especially pine, spruce, paper birch, poplar, and second-growth, especially near water. They forage in wet meadows and coniferous forest and meadows in mountainous areas (Montana Field Guide [Retrieved on February 4, 2010 from http://FieldGuide.mt.gov/detail_ABNSB12040.aspx]). Breeding records have been documented in the BIFO (Lenard et al., 2003).

### Red-headed Woodpecker (BLM Sensitive)

With no systematic surveys completed in Montana, little is known about Red-headed Woodpecker habitat in the state. When this species have been observed, they are usually found along major rivers with associated riparian forest. They may also be found in open savannah

country, as long as adequate ground cover, snags, and canopy cover can be found. Large burn areas may also be utilized by the species (Bent 1939, Ehrlich et al. 1988; Montana Field Guide [retrieved on February 4, 2010 from http://FieldGuide.mt.gov/detail_ABNYF04040.aspx]).

#### 3.7.3.5.11 Amphibians

An inventory of amphibians and reptiles in the BiFO was undertaken and completed in 2006. This inventory recorded where reptiles were located within the region (Vitt et al., 2006). This was the most recent inventory for herps in the Field Office, although numerous other observation locations are available from other sources, such as, "Amphibians and Reptiles Of Montana," Werner et al. 2004.

##### Great Plains Toad (BLM Sensitive)

There is documented occurrence of this species in Yellowstone County; however inventories did not find adults or larvae in Carbon County (Vitt et al., 2006).

##### Northern Leopard Frog (BLM Sensitive)

The northern leopard frog occupies riparian and wetland habitats and typically is found in cattail marshes and beaver ponds in the plains, foothills, and montane zones up to 9,000 feet above mean sea level in the planning area. Adults feed on tadpoles, insects, and other invertebrates. With the exception of the desert and foothills area west of the Pryor Mountains, leopard frogs occur throughout the study area (Vitt et al., 2006).

##### Plains Spadefoot (BLM Sensitive)

There are documented occurrences of plains spadefoot in 15 locations in the planning area. All locations consisted of open areas in and around shallow stock ponds surrounded by friable soils, but at significant distances from any water source (Vitt et al., 2006).

#### 3.7.3.5.12 Reptiles

##### Greater Short-horned Lizard (BLM Sensitive)

Lizards are typically found in sagebrush shrublands with areas of bare ground and a low density of sagebrush. This species was documented at six locations in the BiFO during the inventory (Vitt et al., 2006).

##### Milksnake (BLM Sensitive)

Milksnake habitat is typically rocky hillsides in grassland and shrubland areas. The inventory found seven locations for this snake in the BiFO (Vitt et al., 2006).

##### Snapping Turtle (BLM Sensitive)

Snapping turtle occur in large rivers and adjacent ponds, lakes, and wetlands. Several records exist in eastern Big Horn County and one record in northeastern Yellowstone County. Additional trapping will be necessary to determine whether populations exist in the Yellowstone River farther upstream from the confluence with the Big Horn River(Vitt et al., 2006).

### Spiny Softshell (BLM Sensitive)

This species inhabits large rivers and water bodies and in the BiFO, they are known from the Yellowstone, Musselshell, and Clark's Fork of the Yellowstone rivers. One spiny softshell turtle was documented in Yellowstone County (Vitt et al., 2006).

### Western Hog-nosed Snake (BLM Sensitive)

These snakes are typically found in open habitats with friable soils (i.e., sand) along river banks and floodplains. A few scattered records exist in Big Horn, Stillwater, Yellowstone, and Musselshell counties.

## 3.8 Fisheries Habitat and Special Status Species

Management of fish species and populations in the planning area is regulated and overseen by the MTFWP. The USFWS is responsible for providing regulatory oversight for all species that are listed, proposed for listing, or candidates for listing as threatened or endangered under the Endangered Species Act (ESA). The BLM is charged with conserving and/or enhancing aquatic habitat and riparian areas on BLM administered lands, as well as protecting water quality that is necessary to support the fish and aquatic wildlife populations (amphibians and aquatic insects).

The BiFO management direction is to work cooperatively with USFWS and MTFWP to establish programs that are consistent with ecologically sound and sustainable practices, conserve and enhance high quality aquatic habitat, protect native aquatic species, and enhance game fishing opportunities. In the planning area, the USDA Custer National Forest is also an integral partner in managing sensitive species on shared aquatic habitats. The continuity between managing fish populations and aquatic habitat requires a close working relationship among the agencies to be effective.

The aquatic resources of the planning area include fish and aquatic macro-invertebrates and their habitats. These habitats consist of rivers and streams, springs, seeps, and lakes or reservoirs that provide year round (perennial) or seasonal (intermittent) habitat for a variety of fish species, aquatic macro-invertebrates, and aquatic plant communities (Map 26 – Red and Blue Ribbon Streams). Water quality is a key indicator of environmental conditions for fish and aquatic habitats. Other elements critical to aquatic habitat and suitable fish habitat, including riparian habitat, are water volume, water temperature, and the presence/absence of non-native competitors. The BLM uses its surveys and those done by DEQ and MTFWP to assess the abundance, distribution, and health of fish populations and aquatic habitat in the decision area.

According to MTFWP surveys, 43 species of fish are present in the planning area (Table 3-30). Of these species, 28 are indigenous and 15 species are introduced. Most are warm water species that live in the lower Yellowstone and Musselshell rivers; only a few are coldwater species that live in the mountain streams.

**Table 3-30 Native and Non-Native Fish Species Occurring in the Planning Area**

| Native | Scientific Name | Non-Native | Scientific Name |
|---|---|---|---|
| Bigmouth buffalo | *Ictiobus cyprinellus* | Blackhead bullhead | *Ictalurus melas* |
| Brassy minnow | *Hybognathus hankinsoni* | Black crappie | *Pomoxis nigromaculatus* |
| Brook stickleback | *Culaea inconstans* | Brook trout | *Salvelinus fontinalis* |
| Burbot | *Lota lota* | Brown trout | *Salmo trutta* |
| Channel catfish | *Ictalurus punctatus* | Common carp | *Cyprinus carpio* |
| Emerald shiner | *Notropis atherinoides* | Green sunfish | *Lepomis cyanellus* |
| Fathead minnow | *Pimephales promelas* | Largemouth bass | *Micropterus salmoides* |
| Flathead chub | *Hybopsis gracilis* | Pumpkinseed | *Lepomis gibbosus* |
| Freshwater drum | *Aplodinotus grunniens* | Rainbow trout | *Oncorhynchus mykiss* |
| Goldeye | *Hiodon alosoides* | Smallmouth bass | *Micropterus dolomieu* |
| Lake chub | *Couesius plumbeus* | Spottail shiner | *Notropis hudsonius* |
| Longnose dace | *Rhinichthys cataractae* | White crappie | *Pomoxis annularis* |
| Longnose sucker | *Catostomus catostomus* | Yellow bullhead | *Ictalurus natalis* |
| Mottled sculpin | *Cottus bairdi* | Yellow perch | *Perca flavescens* |
| Mountain sucker | *Catostomus platyrhynchus* | Walleye (unknown) | *Stizostedion vitreum* |
| Mountain whitefish | *Prosopium williamsoni* | | |
| Northern pike | *Esox lucius* | | |
| Northern red-bellied dace | *Phoxinus eos* | | |
| Plains minnow | *Hybognathus placitus* | | |
| River carpsucker | *Carpiodes carpio* | | |
| Sand shiner | *Notropis stramineus* | | |
| Sauger | *Stizostedion canadense* | | |
| Shorthead redhorse | *Moxostoma macrolepidotum* | | |
| Smallmouth buffalo | *Ictiobus bubalus* | | |
| Stonecat | *Noturus flavus* | | |
| Western silvery minnow | *Hybognathus argyritis* | | |
| White sucker | *Catostomus commersoni* | | |
| Yellowstone cutthroat trout | *Onchornynchus Clarki bouvieri* | | |

**Note:**
Source:

## 3.8.1 Coldwater Species

Higher elevation waters located in the Pryor Mountains and Beartooth Mountain Front support coldwater fish, including the Yellowstone cutthroat trout (YCT), classified as a sensitive species by the BLM and an S2 state classification (at risk of local extinction). The emphasis of BLM habitat management is to protect and enhance native species habitat, such as for the YCT (Maps 27, 28). In the decision area, Crooked, Bad Canyon, and Piney creeks are strongholds of isolated, genetically pure populations of YCT. Table 3-31 shows the total miles of fish bearing water in the decision area.

**Table 3-31 Fish Bearing Streams in the Decision area**

| Stream Name | Miles | Sensitive Species | Cold/Warm |
|---|---|---|---|
| Bad Canyon Creek | 5.1 | YCT | Cold |
| Bear Creek | 2.4 | | Warm |
| Boulder River (MF) | 0.25 | | Cold |
| Boulder River (WF) | 0.5 | | Cold |
| Bridger Creek SF | 2 | | Warm |
| Bridger Creek Spring | 0.5 | | Warm |
| Clarks Fork River | 3.85 | | Warm |
| Crooked Creek | 3.5 | YCT | Cold |
| Musselshell River | 0.5 | | Warm |
| Piney Creek | 0.33 | YCT | Cold |
| (unnamed Creek at PP) | 0.5 | Sauger | Warm |
| Sage Creek | 3.78 | | Warm |
| Stillwater River | 1 | | Cold |
| Willow Creek | 1 | | Warm |
| Yellowstone River | 18.25 | Sauger/Pallid | Warm/Cold |

**Note:**
Source:

## 3.8.2 Warmwater Species

Lower elevation streams across the planning area support a diverse population of warm water fish. Sauger, walleye, smallmouth bass, and channel catfish are the prized game fish of the system. Special status species include the BLM sensitive sauger, a rare occupant of the Yellowstone River and the Clarks Fork of the Yellowstone in the planning area.

Due to the fragmented nature of BLM ownership in the planning area, fisheries management activities are limited to providing the best riparian conditions possible and maintaining high levels of aquatic and riparian protection from other resource uses, including recreation, grazing, and fuels extraction. State water quality laws dictate planning in these disciplines, and the BLM adopted Standards and Guidelines for Livestock Grazing Management help to ensure riparian proper functioning condition (PFC).

Riparian vegetation is an important factor in maintaining aquatic resource conditions. Riparian vegetation provides in stream habitat for fish, adds structure to the banks, reduces erosion, moderates water temperatures, and is a source of organic nutrients for the system. Riparian vegetation moderates flows by reducing runoff to the stream and stores water for later release. As riparian habitats degrade, erosion and sedimentation increase and streams widen and become shallower. Temperature fluctuations increase and oxygen content can reach critically low levels. These factors collectively reduce or degrade available fish habitat. Protecting

riparian habitats and restricting water quality degradation on BLM lands does not ensure aquatic health, because the majority of the streams are flowing through multiple ownerships before they reach BLM parcels.

The BiFO has limited aquatic resources. Fish bearing streams, lakes, and reservoirs are rare, with only 15 perennial fish bearing streams and no lakes or reservoirs on public lands that support game fish (Montana Fish Information System [MFISH] website). There are only a handful of reservoirs, with partial BLM ownership, that support populations of non-game fish; however, the Montana Fisheries Information System reports no lakes or reservoirs in the decision area that support sport fisheries. The small, unnamed reservoirs that support small non-game fish populations are not listed in Table 3-31 because they are impoundments of the streams that are listed. However, the importance of these resources does not diminish due to their limited stature, but actually increases due to the rarity. Aquatic resources (fisheries or non-fisheries related) are important natural resources, especially in the arid or semi-arid environments found in the planning area. Wildlife, livestock grazing, and farming are all dependent on water or riparian habitat, which make up a small percentage of the landscape. Therefore, the limiting factors of these land uses are riparian and aquatic resources.

## 3.8.3 Fisheries Management

Management of fish species and populations is regulated and overseen by MTFWP. The BiFO is charged with conserving and/or enhancing aquatic habitat and riparian areas as well as protecting water quality necessary to support fish and aquatic wildlife populations (amphibians and aquatic insects). Management guidance for enhancing riparian and wetland ecosystems has contributed to fisheries management, just as riparian health and water quality are directly related to fisheries health.

Water quality is a key indicator of environmental conditions for fish and aquatic habitats. Other elements critical to aquatic habitat and suitable fish habitat, including riparian habitat, are water volume, water temperature, and the presence/absence of non-native competitors. The BLM uses its surveys and those done by DEQ and MTFWP to assess the abundance, distribution, and health of fish populations and aquatic habitat in the planning area.

Some native fish species populations and habitats have declined in the past due to natural disturbances (drought), habitat alteration, poor water quality, lack of water quantity, and hybridization with or competition from with non-native species.

## 3.8.4 Non-Native Invasive (Nuisance) Aquatic Species

Aquatic Nuisance Species (ANS) are non-indigenous plant or animal species that threaten diversity and abundance of native species, the ecological stability of aquatic systems, or commercial, agricultural, and recreational activities dependent on said systems.

MTFWP has assembled and prioritized a list of aquatic nuisance species that are either established in Montana or have a high potential to invade Montana waters. MTFWP has also developed the Aquatic Nuisance Species Management Plan (2002) which addresses prevention of invasion, mitigation of impacts for species already present, and other measures to control ANS. There are currently 26 species of plants and animals on the MTFWP ANS list (Table 3-32) with only 7 listed as present in Montana. Priority classes are defined below.

- **Priority Class 1 –** These species are not known to be present in Montana, but have a high potential to invade and there are limited or no known management strategies for these species. Appropriate action for this class includes prevention of introductions and eradication of pioneering populations.
- **Priority Class 2 –** These species are present and established in Montana and have the potential to spread further and there are limited or no known management strategies for these species. These species can be managed through actions that involve mitigation of impact, control of population size, and prevention of dispersal to other water bodies.
- **Priority Class 3 –** These species are not known to be established in Montana and have a high potential for invasion and appropriate management techniques are available. Appropriate management for this class includes prevention of introductions and eradication of pioneering populations.
- **Priority Class 4 –** These species are present and have the potential to spread in Montana but there are management strategies available for these species. These species can be managed through actions that involve mitigation of impact, control of population size, and prevention of dispersal to other water bodies.

**Table 3-32 Aquatic Nuisance Species in the Planning Area**

| Species | | |
|---|---|---|
| **Common Name** | **Scientific Name** | **Priority Class** |
| **Fish** | | |
| Big Head Carp | *Hypophthalmichthys nobilis* | 1 |
| Grass Carp | *Ctenoparyngodon idella* | 1 |
| Black Carp | *Mylopharyngodon piceus* | 1 |
| Silver Carp | *Hypophthalmichthys molitrix* | 1 |
| Round Goby | *Neogobius melanostomus* | 1 |
| Ruffe | *Gymnocephalus cernuus* | 1 |
| Tench | *Tinca tinca* | 1 |
| Zander | *Sander lucioperca* | 1 |
| Northern Snakehead | *Channa argus* | 1 |
| **Crustaceans** | | |
| Rusty Crayfish | *Orconectes rusticus* | 1 |
| Spiny Waterflea | *Bythotrephes cederstroemi* | 1 |

| Species | | |
|---|---|---|
| **Common Name** | **Scientific Name** | **Priority Class** |
| **Molluscs** | | |
| Zebra Mussel | *Dreissena polymorpha* | 1 |
| New Zealand Mud Snail | *Potamopyrgus antipodarum* | 2 |
| **Mammals** | | |
| Nutria | *Myocastor coypus* | 1 |
| **Parasites / Pathogens** | | |
| Whirling disease | *Myxobolus cerebralis* | 2 |
| Heterosporosis | | 1 |
| IHN Virus | | 1 |
| Asian Tapeworm | *Bothriocephalus acheilognathi* | 3 |
| **Plants** | | |
| Egeria | *Egeria densa* | 1 |
| Hydrilla | *Hydrilla verticillata* | 1 |
| Eurasian Watermilfoil | *Myriopyllum spicatum* | 3 |
| Curley Pondweed | *Potamogeton crispus* | 4 |
| Flowering Rush | *Butomus umbellatus* | 4 |
| Purple Loosestrife | *Lythrum salicaria* | 4 |
| Salt Cedar | *Tamaricaceae spp.* | 4 |
| Yellow Flag Iris | *Iris pseudacorus* | 4 |
| | | |

**Note:**
Source: MTFW; (http://fwp.mt.gov/fishing/guide/ANS/priorityClasses.html)

All the species listed above can have profound ecological impacts, generally disrupting the natural food chain or impairing ecosystem and native species health. Riparian systems and water bodies are vulnerable to nuisance species invasion due to the transport of boats, road runoff, human associated activities, and other mechanisms. The spread of nuisance species is usually rapid and hard to control because of the connectivity and movement associated with rivers and aquatic systems in general.

## 3.8.5 Fisheries Special Status Species

Special status species are species listed as threatened or endangered under the Endangered Species Act (ESA), species proposed or candidates for listing, species designated as sensitive by BLM, and state listed species. These species require particular management attention due to population or habitat concerns. Rules and regulations describing BLM requirements in managing Special Status Species are described in Section3.7.3.3 (Wildlife Special Status Species) page 3-74.

The BiFO is responsible for managing fisheries habitat in the decision area, while management of fish species is overseen by state and federal wildlife management agencies. The MFWP manages resident fish populations. The USFWS provides regulatory guidance for all fish species that are listed, proposed for listing, or are candidates for listing under the ESA.

Fisheries habitat includes perennial and intermittent streams, lakes, and reservoirs that support fish through at least a portion of the year. Fisheries habitats in the planning area encompass portions of six large watersheds: the Bighorn River, Boulder River, Clarks Fork of the Yellowstone River, Musselshell River, Yellowstone River, and the Stillwater River.

Special status species are native taxa that are at risk due to declining population trends, habitat threats, restricted distribution, and other factors. Three special status fish species have been identified in the planning area, the Northern Redbelly X Finescale Dace, the sauger, and the YCT.

### 3.8.5.1 Northern Redbelly X Finescale Dace (BLM Sensitive)

This fish was placed on the special status species list due to its rarity and unusual form of genetic reproduction (MFISH). In Montana, northern redbelly dace are fairly widespread east of the Continental Divide. Finescale dace have been found in the Milk River drainage in the Cypress Hills, just north the Canadian border, well removed from the planning area (MFISH).

Further inventory is needed to better define *Phoxinus spp.* distribution in Montana. Due to difficulties of field differentiation, it is likely that some waters thought to contain only northern redbelly dace may also have the hybrid. *Phoxinus spp.* is not extremely common in Montana. Dr. Robert Bramblett (MFISH) has conducted surveys on 43 prairie streams of the Missouri and Yellowstone rivers and identified *Phoxinus spp.* at just three sites, one of which contained the hybrid. Few prairie streams in Montana have the clear pool-type habitat preferred by this hybrid. Due to the limited distribution and knowledge of this species, it is important to reduce impacts to its known habitat. In the Billings Field office decision area, eight streams have been identified with populations of this species. The streams do not fall in the decision area, however drainage from BLM administered lands do contribute to some of the streams. Managing for healthy riparian areas and quality water resources on BLM managed public lands will help to reduce impacts on the Northern Redbelly X Finescale Dace populations should they occur in the decision area (www.fisheriessociety.org/AFSmontana/RedbellyHybrid.html).

### 3.8.5.2 Sauger (BLM Sensitive)

Sauger populations throughout Montana have fallen dramatically. In the main stem of the Yellowstone River, distribution is now considered limited to downstream of Rosebud Creek and is rare or absent in other portions of the river and its major tributaries.

Sauger, known to be a migratory species, is heavily dependent on unimpeded access to the wide diversity of physical habitats present in large river systems. The Yellowstone River system has many barriers impeding fish passage, some in the main stem and many throughout the tributaries. The need to travel throughout a system to find suitable habitats for various life stages, coupled with competition from non-native walleye (*Sander vitreum*), are likely the two dominating factors in the sauger's decline. BLM ownership and influence on the main stem Yellowstone and Clarks Fork of the Yellowstone rivers is fragmented. For example, of 147 Yellowstone river miles in the planning area, BLM manages 18.55 miles, the majority of which is limited to small stretches of a single river bank. The Billing Field Office has little influence

over the factors that impact sauger viability, with managing for overall watershed health being the primary objective to provide functioning riparian conditions and quality water resources (www.fisheriessociety.org/AFSmontana/Sauger.html).

### 3.8.5.3 Yellowstone Cutthroat Trout (BLM Sensitive)

In its historical range, this subspecies is considered a species of special concern or a sensitive species by many state and federal agencies and organizations. In 1998, it was petitioned for listing as a threatened species under the ESA; however this petition was rejected in February 2001 (Maps 27 and 28).

YCT numbers have declined in distribution and abundance throughout its range. A survey of biologists (AUTHOR 1996) concluded that in Montana, YCT occupied 32 percent of their historical range. Most remaining indigenous populations in Montana inhabit headwater streams and the upper Yellowstone River. It is also estimated that only 10 percent of the historically occupied fluvial habitat still contains genetically pure populations (May 1998). (www.fisheriessociety.org/AFSmontana/Yellowstone.html)

Non-native fish species are generally considered the greatest threat to the persistence of YCT. Displacement of native fish species by brown trout, brook trout, and hybridization with rainbow trout have been thoroughly documented in the region. Habitat fragmentation from irrigation diversion, culvert barriers, and other manmade obstacles has also contributed to the downfall of YCT.

In the past decade, several projects have been designed to specifically enhance sensitive fish species populations on public lands in the planning area.

#### 3.8.5.3.1 Bad Canyon Creek

The BLM partnered with MTFWP and the Custer NF to stabilize and enhance a fish barrier on Bad Canyon Creek. The barrier would isolate a genetically pure YCT population in BLM and FS waters, blocking the upstream passage of non-native brown trout that thrive in lower Bad Canyon Creek and the Stillwater River.

#### 3.8.5.3.2 Crooked Creek

In 2007, the BLM partnered with MTFWP and the Custer NF to protect eight miles of pristine YCT habitat from invasion by non-native brown trout which are present in the lower reaches of Crooked Creek. The project included an engineered barrier designed to block fish passage and withstand 100 year flood events for an indefinite time. A subsequent MTFWP project removed all brown trout from the isolated reach, allowing the aboriginal YCT population to expand uninhibited from non-native competition.

#### 3.8.5.3.3 Piney Creek

The MTFWP and BLM began planning a project on the BLM administered Piney Creek waters to enhance pool and over wintering habitat for an imperiled, isolated population of YCT. This population is limited to approximately 1 ¼ miles of cold, clean spring water that runs from the

Custer NF through BLM and private land and then onto state land, where it is diverted into an irrigation system. Barring dewatering and upstream pollution sources, riparian health is the most significant limiting factor to aquatic resources and good water quality.

To manage fish and special status fish species habitat, the Bureau of Land Management follows guidelines from land planning efforts and regulatory plans and guidance established:

Best management practices, state, and federal guidance concentrate on protecting riparian habitat and function as well as water quality. A clear establishment of the importance of riparian health is critical in understanding the connectivity between riparian vegetation, water quality and quantity and fisheries resources.

## 3.9 Wild Horses and Burros and Pryor Mountain Wild Horse Range

The wild horse and burro program is unique to the BLM as it is the only program where the BLM is responsible for both the land resources and the animal. Perhaps no other program within the BLM receives as much public interest and scrutiny than the wild horse and burro program. The health, nutrition, and well-being of the animals are closely watched and criticized by numerous individuals and organizations interested in wild horses. These groups present unique opportunities for cooperative and collaborative partnerships as well as manufacturing controversy.

The Billings Field Office is home to one herd of wild horses located within the Pryor Mountain Wild Horse Range (PMWHR). The PMWHR is located approximately 50 air miles south of Billings, Montana and nine air miles northeast of Lovell, Wyoming. It occupies an area of 37,494 acres in northern Big Horn County, Wyoming and southeastern Carbon County, Montana.

The exact origin of the wild horses within the PMWHR is not entirely known, though there is much supposition. Many claim the horses are descendants of animals the Crow or Shoshone Indians got from the Spanish or other tribes in contact with the Spanish. The Crow had horses in the early 1700s and inhabited the Pryor Mountains before European settlement. Others claim the horses have been there forever. Wild horses within the Bighorn Basin were well documented by the early 1900s. Most likely, the wild free-roaming horses inhabiting the PMWHR are descendants of numerous founding stock.

Genetic tests conducted between 1992 and 2009 by Dr. Gus Cothran identified the Pryor horses as descendants of New World “Spanish” breeds (saddle type horses) descendent from light riding and racing breeds and related to European Iberian breeds. The Pryor horses carry a rare allele variant Qac that is traced back to original New World “Spanish” type horses that were developed from the original Spanish and Portuguese (Iberian) horses that were brought to the Americas. This has resulted in confirmation by many members of the public that this is a unique herd of wild horses and fears that this herd and its genetic make-up could be lost. Wild horses from other wild horse herds were periodically introduced, but this practiced ended in the early 1990s.

Generally, wild horse use tends to shift with forage and water availability and elevation accessibility. Wild horses tend to live in bands or older horses may live solitary. The typical band is led by one dominant mare that controls the day to day activities, unless the stallion feels threatened and moves the band out of an area. A band can range in size from one mare and one stallion to numerous mares and one stallion with their progeny. A bachelor band is typically comprised of young males (though older males may join which have lost their band) that are not yet mature enough to build a band and defeat rival stallions for mares or steal a mare. Typically but not exclusively young males tend to be displaced from the family band upon reaching breeding age.

The PMWHR (Map 29 – Pryor Mountain Wild Horse Range) is a diverse and complex area; topographically, geologically, ecologically and land tenure. It varies in environment and elevation from a sagebrush/salt-shrub dominated cold desert at about 3,850 feet in the Wyoming portion, to a subalpine setting with subalpine fir and open meadows in at the northernmost portion within Montana at about 8,750 feet. The majority of the range within Montana is a semi-arid cold desert. The area is composed of private, United States Forest Service, National Park Service, and BLM administered lands (see Appendix Q regarding Montana administration of the Wyoming portion of the PMWHR). There are several overlapping designations, including all or portions of three BLM WSAs, one NPS WSA, and one Forest Service recommended wilderness. The other designations are the East Pryor ACEC and the Crooked Creek Natural Area. There are numerous sensitive plants and animals, rare geologic formations, numerous caves, vertebrate and invertebrate fossil beds, high occurrence of archeological resources and American Indian spiritual sites. The area is highly prized for (non-wild horse related) recreational activities. As a result, special management considerations are required to address resource conflicts, be consistent with other agencies' policies or plans, and conform to regulations and laws.

The PMWHR was initially designated by order of the Secretary of the Interior in 1968 (Appendix Q). At that time, the PMWHR encompassed BLM and NPS lands only within Montana. In 1969, another Secretarial Order added approximately 6,400 acres of lands (both BLM and NPS) in Wyoming to the PMWHR. In December 1971, the Wild Free-Roaming Horses and Burros Act became law. The management and protection of all unclaimed wild horses and burros was delegated to the secretaries of the Interior and Agriculture. The BLM and USFS were charged with administration of the Act. In 1974 and 1975, the range was expanded pursuant to authority contained in the Wild and Free-Roaming Horses and Burros Act which directed the BLM and Forest Service to manage wild horses "where presently found." (Map 30 – Herd Area Map)

Adjustment to the range occurred once again in 1984 with the temporary inclusion of the Sorenson Extension (using two five year special use permits) from the Bighorn Canyon National Recreation Area (BCNRA) and closure of the administrative pastures for gathering purposes.

In 1990, the last adjustment occurred when the Sorenson Extension was not reauthorized by BCNRA. This resulted in the present boundary that encompasses 37,494 acres (24,595 acres of this area is BLM administered lands).

## 3.9.1 Population and Resource Management

The BiFO protects, manages, and controls wild horses and burros within the PMWHR under the authority of the 1971 Wild Free-Roaming Horses and Burros Act (as amended by Congress in 1976, 1978, and 2004). One of the BLM's key responsibilities under the Wild and Free-Roaming Horse and Burro Act (as amended) is to manage for a "thriving natural ecological balance" (TNEB). This mandate is typically achieved by balancing the wild horse population within the available resources through the appropriate management level (AML) to protect the range from deterioration while maintaining multiple-use relationships.

The long term average population of wild horses has been 159 wild horses. The population has varied from 87 wild horses to 195 wild horses. In 1978 an ice storm and limited forage resources resulted in a large die-off resulting in the lowest documented population wild horses. Gathers and removals have been the most widely used tool to achieve a TNEB. Removals historically have occurred on average every other year. Over 600 wild horses have been removed from the PMWHR since its establishment. Once an animal is removed it is typically offered for adoption. Every wild horse removed from the PMWHR has been placed.

Since 2001 fertility control has been utilized. Fertility control vaccine has been applied from a total of 5 mares in a year to currently 70-80% of the mare population. In 2003 and 2004 there was a loss of the nearly the entire foal crops. This has been attributed to predation and to poor forage production from drought that may have resulted in low milk production of lactating mares. The absolute cause was not definitively determined.

The Pryor Mountain Herd Management Plan (HMAP) (HMAP, BLM-MT-PT-84-019-4321/June 1984) and the Billings Resource Area Management Plan (September 28, 1984) established an initial stocking rate (appropriate management level) for the range at 115-127 wild horses. The 1984 HMAP also identified managing for "Pryor characteristics", which include aspects such as selection for a younger herd or even sex ratio. The HMAP was revised in July 1992 and re-established the appropriate management level (AML) at 85-105 adult horses (MT-025-2-18).

The PMWHR HMAP and Environmental Assessment issued May 2009 made a management shift to focus on habitat enhancement through range projects (waters, fences and riparian), and management of vegetative communities. The population management would utilize gathers, fertility control, and natural controls to maintain an appropriate management level (AML) of 90-120 wild horses (excluding foal crop). Within the population itself the management focus is to conserve traits, genetic diversity, maintaining Spanish characteristics, and bloodlines within the herd.

A wild horse population above the appropriate management level (AML) resulted in the same areas of the PMWHR being over-utilized annually. The result is deterioration of range resources and reduced carrying capacity of the land. Conversely mid-slope areas, within the PMWHR have remained relatively un-impacted by wild horse grazing. Many areas of the PMWHR are unavailable for grazing due to slope (cliffs) or provide little or no forage due to the type of ecological site potential such as the mountain mahogany belt and the Douglas-fir forest. If the PMWHR had uniform use the potential carrying capacity in 1984 was determined

to be 179 wild horses. Since that time in 2004 the potential carrying capacity was determined to be 142 wild horses a reduction in potential capacity of 37 wild horses or 444 animal unit months. (Map 29 – Pryor Mountain Wild Horse Range)

## 3.10 Cultural and Heritage Resources

Cultural resources are definite locations of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional, cultural, or religious importance to specified social and/or cultural groups. Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identification, protection, and utilization for public benefit.

Cultural resources are assessed for integrity or as having unique qualities that make the resources eligible for the National Register of Historic Places (NRHP), which provides for management and protection of these resources. There are three main standards that a cultural resource must meet to qualify for listing on the NRHP: age, integrity, and significance. To meet the age criteria, the resource generally must be at least 50 years old. To meet the integrity criteria, the resources must possess integrity of location, design, setting, materials, workmanship, feeling, and association. Finally, the resources must be significant according to one or more of the following criteria:

- **Criterion A –** Be associated with events that have made a significant contribution to the broad patterns of our history; or
- **Criterion B –** Be associated with the lives of persons significant in our history;
- **Criterion C –** Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
- **Criterion D –** Have yielded, or may be likely to yield, information important in prehistory or history.

### 3.10.1 Cultural History Overview

The Billings Field Office planning area is situated within the area known as the Northwestern Plains, although portions of the area also include the eastern slope of the Rocky Mountains (Beartooth Range) and several island mountain ranges, including the Pryor Mountains, Crazy Mountains, Big Snowy Mountains, Little Snow Mountains, and Bull Mountains. The prehistory and history of the Northwestern Plains generally include five cultural periods: Paleoindian, Middle Prehistoric, Late Prehistoric, Protohistoric, and Historic. Within the prehistoric periods are various complexes, phases, and sub-phases.

### 3.10.1.1 Paleoindian (11,500 B.P. to 7,500 Before Present [B.P.])

Paleoindian groups were nomadic and traveled over large areas to hunt big game (e.g., mammoth) using heavy thrusting or throwing spears tipped with stone points. Climatic conditions during the early part of the period were cooler than today, but became warmer and possibly drier towards the end of the period. Populations were small and sites were occupied on a short-term basis. Dominant projectile point styles appear to have been a number of large, concave-based, lanceolate forms. Some of the points were fluted. Several point types have been named (Clovis, Folsom, Goshen, Midland, Plainview), and cultural complexes or phases often have been named on the basis of the point style. During the end of the Paleoindian period, the development of two separate economic strategies begins to appear on the Northwestern Plains. One included broad-spectrum hunting and gathering in the mountains while the other was a communal bison hunting pattern on the open plains.

### 3.10.1.2 Middle Prehistoric (7,500 B.P. to 1,800 B.P.)

The early part of the Middle Prehistoric (8,000 to 5,500 B.P.) occurred during a relatively dry climatic episode referred to as the Altithermal. Early Middle Prehistoric populations moved into mountain, foothill, and river valley regions where resources were abundant and tended to concentrate in areas with dependable water sources. Subsistence strategies generally are similar to late Paleoindian groups, with an emphasis on big game hunting. Projectile point styles generally are smaller than Paleoindian forms and often incorporated broad side notches. A significant technological innovation, the spear thrower or atlatl, replaced thrusting spears during the early Middle Prehistoric.

During the middle of the period (5,500 B.P. to 3,000 B.P.) groups began to adopt increasingly specialized subsistence and settlement strategies. The regional climate shifted from the hot and dry conditions of the Altithermal to the Sub-boreal climatic episode of cool and moist conditions. The improved climatic conditions led to increased resource availability, which in turn led to increases in the number of sites and an expansion in geographical distribution to access seasonal resources. Prehistoric people of this time exploited big game such as bison, elk, and bighorn sheep, and smaller animals such as foxes, birds, and rabbits. Grinding slabs and manos, in addition to roasting pits and cooking hearths, indicate an increase in plant resources. Projectile points take on a range of forms from the un-notched McKean lanceolate to side-notched, corner-notched, and corner-removed Duncan and Hanna variants.

Cool and wet conditions associated with the Sub-altithermal climatic episode occurred during the transition to the late Middle Prehistoric (3,000 B.P. to 1,800 B.P.). Settlement and subsistence strategies are similar to the middle period, with bison as the main focus of hunting. The atlatl and dart remain as the weapon of choice, but McKean complex points are replaced by several varieties of corner-notched styles associated with the Pelican Lake complex. Near the end of the late Middle Prehistoric, medium to large side-notched projectile points associated with the Besant complex begin to replace Pelican Lake forms. Besant people developed highly specialized communal hunting techniques and also were the first cultural group to have constructed and used ceramic vessels. Groups continued to occupy river valley and foothill

settings, while also devoting more time and attention to the prairies. This change of focus is illustrated by the adoption of communal hunting techniques and development of the tipi.

### 3.10.1.3 Late Prehistoric Period (1,800 B.P. to 200 B.P.)

The Late Prehistoric Period is characterized by an increased specialization toward upland living and utilization of open prairie resources, including bison and pronghorn. Prehistoric populations lived in the upland areas for most of the year, specifically on bluff edges and high terraces overlooking river or creek valleys. Smaller social groups or family units used lowlands and forested areas for shorter intervals to collect plants and gather wood for tipi poles, and for quarrying and seasonal hunting. At this time, the introduction of the bow and arrow occurs, as well as a more widespread though still relatively rare use of pottery.

Cultural complexes associated with this period are Avonlea and Old Womens. During the Avonlea (1,450 B.P. to 950 B.P.), the use of the bow and arrow became more widespread, with an increased focus on bison as a primary resource. Communal bison hunting was the main economic pursuit of Avonlea people, and bison trapping in thaws, breaks, and corrals were favored strategies. Avonlea points have low and very shallow side notches and typically have concave bases.

The basic adaptation of the Old Womens phase (1,050 B.P. to 200 B.P) was an extreme specialization on upland living and communal hunting of upland game animals, principally bison. Old Womens points are side notched, but corner-notched, tri-notched, and un-notched styles also are present. Groups using Old Womens points still carried out special purposes and activities in lowland resources and locations; but the vast majority of sites are in open upland spots, which indicate a commitment to year-round occupation. The use of tipis is more common during this phase compared to the Avonlea phase.

### 3.10.1.4 Protohistoric Period (200 B.P. to 50 B.P.)

The Protohistoric Period is characterized by non-Indian immigration, trade of European items (e.g., glass beads, brass pendants, musket balls), and the introduction of the horse and guns. Of all the trade items, the horse had the greatest impact on Native American cultures. With acquisition of the horse, groups were not tied to upland living for their main subsistence, which led to larger winter villages in lowland valleys. The increased opportunity to chase bison herds on horseback also led to a decline in communal bison drives.

The main subsistence strategy during this period still was bison hunting, but other options were available. Trading for goods and transporting goods by horse allowed for economic opportunities not previously possible to the tribes. Trapping and fur trading also became a subsistence alternative for some tribal groups. Guns were available through the trading posts established along many of the major rivers; however, a muzzle-loading firearm was difficult to reload on horseback, so the bow and arrow was used more often for hunting. During this time, metal points replaced many of the previous stone projectile points.

#### 3.10.1.5 Historic Period (A.D. 1700 to the present)

The Historic Period distinguishes itself from previous periods with the introduction of mining, railroads, homesteading, farming, and ranching. A relatively large influx of people to the area also occurred during this time, as well as a concentrated land use that initially involved agricultural activity. Early expeditions and campaigns that mapped the land did so in order to provide a guide for land expansion and to expand communication and commerce to the Pacific Coast. Early missionaries and the Lewis and Clark expedition were followed by trappers, traders, pioneers, miners, and homesteaders. This focus on land ownership and intensive use of the environment dramatically changed the landscape. Consequently, the native populations became displaced and eventually were moved onto reservations.

The Homestead Act of 1862 offered free government land to all American citizens and provided farmers with 160 acres of land for a filing fee after fulfilling a five-year period of "proving-up." Contrary to the advertisements, the soil was poor and the seasons were dry. As a result, irrigation was necessary. New techniques for dry farming allowed for some farming and ranching success; however, most ranches and farms required large amounts of water, which resulted in the development of dams and diversions to supply water for these industries. Various phases of homesteading acts and land offerings continued to draw people into the area.

In 1869, the first transcontinental line (Union Pacific-Central Pacific) traveled over the old Oregon-California Trail. The rail line facilitated movement west and transport of goods east; it also put more pressure on the land to provide goods for markets. A total of 44 million acres were granted to the railroad. Of those, 17 million were in Montana territory, making the railroad the second largest landowner in the state after the federal government. Since railroads were granted large tracts of land for construction purposes, the railroad companies sold these tracts off to businesses and individuals interested in settling the area. Many banks and land holding companies bought large tracts of railroad land, and in turn sold them to prospective farmers.

The need for oil and gas soon developed, and in Montana many of the earliest discoveries did not result from drilling, but rather by witnessing natural oil seeps. The first significant oil field in the planning area was discovered in 1915. In addition, small coal mines and fields were opened in the area to accommodate mining industries, and then later for the coal-fired, steam-powered railroads. Coal is now Montana's leading energy resource. Currently, these industries are the primary users of the land, along with growing tourism and residential use.

### 3.10.2 Site Types

Cultural resources in the planning area have been classified according to one or more site types. Site types are groupings of sites with similar physical or cultural characteristics. Complete information may not be readily available during the original recordation to determine the functional or cultural site type. Consequently, some sites may be re-categorized after additional research. Sites fitting into more than one category usually are more complex and have more information potential than do single-category sites. At the broadest level, cultural resources are categorized as either prehistoric or historic.

### 3.10.2.1 Prehistoric Site Types

Prehistoric sites can be associated with one or more broad thematic periods: Paleoindian, Middle Prehistoric, Late Prehistoric, and Protohistoric. There are prehistoric sites within the planning area from each period. Table 3-33 lists the prehistoric site types documented in the planning area.

**Table 3-33 Prehistoric Site Types**

| Site Type | Description |
|---|---|
| Tipi Ring, Stone Circles, and Ring Sites | This is a relatively common site type in the planning area and includes circles of stones interpreted as having been used to hold down tipi lodge covers. Tipi rings are conjoining stones in circular to ovoid configurations. Some large circles or ovals, which may not actually represent domestic lodges, may be evidence of medicine lodges, dance lodges, and other ceremonial or specialized structures. |
| Conical Timber Lodge | Conical timber lodges are often stand-alone structures made of a ring of upright poles around a central post with wood and bark inlayed between the uprights. Few artifacts typically are associated with the lodge and the use of the lodge is unknown. |
| Lithic Scatters/Chipping Stations | The term "lithic scatter" is very broadly applied to a range of sites containing stone cultural material. These may be sites representing the remains of limited chipped stone tool manufacture or repair, generally viewed as having temporary or short-term use and low information value, or sites with a greater variety of artifacts, features, and attributes, as well as unknown depositional characteristics. |
| Fire Hearths, Roasting Pits, and Fire-cracked Rock | Those sites with any combination of these features include lithic scatters and tipi ring sites. Hearths are remains of a feature where humans purposely used fire. This includes clay or rock-lined fire pits, ash pits, roasting pits, ash stains, and fire-cracked rock concentrations or scatters. |
| Cairns and Rockpiles | This site type includes piles of rocks ranging in size from a few stones to larger cairns up to three meters in diameter. The function of cairns and rockpiles has not been clearly demonstrated; however, some argue that larger cairns may have served as ceremonial or other important functions such as burials and trail markers, and to commemorate people or events. Functions of smaller cairns are even less apparent, though clusters of cairns may represent effigies. |
| Rock Alignments | Rock alignments generally are linear, straight to curving arrangements of piled stone and of various lengths. Some alignments are known to be part of communal animal kill sites and are referred to as drive lines which were used to steer animals in the direction of the kill site. The function of other shorter linear alignments is not clear. |
| Communal Kill Sites | These sites are noted as ambush game drives, buffalo jumps, bison pounds or traps, or other kill sites including processing areas. The sites primarily are defined by the occurrence of high numbers of animal bone, generally in a bone bed, and a high density of hunting and butchering tools in the artifact assemblages. |
| Vision Quest Structures and Medicine Wheels | Vision quest sites and medicine wheel sites are considered linked to ceremonial and religious activities. The sites typically are a u-shaped or oval stone feature forming low enclosures. Vision quest sites often are found on prominent parts of the landscape, such as mountains, bluffs, hills, cliffs, rock outcrops, and buttes. Medicine wheels also are structures constructed of piled and placed stones and have at least two of the three general elements: 1) a central stone cairn; 2) one or more concentric stone circles; and/or, 3) two or more stone lines radiating outward from a central point. |

**Table 3-33 Prehistoric Site Types**

| Site Type | Description |
|---|---|
| Eagle Catching Pits/Traps, Battle Pits, Other Pits, Lookouts, and Fortifications | These site types are defined by reference to the ethnographic and ethnohistoric record, which constitutes the basis of their inferred function. Descriptions of eagle-catching techniques also are recorded in ethnographies and ethnohistoric documents, and their descriptions often are used to infer function of some features based on form and location. |
| Lithic Procurement Sites/Quarries | Lithic procurement sites are classified under the site type headings of bedrock or surface quarry. Bedrock quarries are defined by the existence of bedrock exposures at the sites; whereas, surface quarries are defined by areas where lithic material occurs as "free rock" in cobble, nodular, or pebble form. Primary chert quarries tend to be located along the sides of mountains where the material is found in outcrops. Any material that was carried into an area by a natural agent is a secondary quarry, such as basalt found in ancient and present-day river beds. |
| Rockshelters/Caves | Rockshelters consist of a rock outcrop or large boulder that provides shelter from wind, sun, rain, and other elements. |
| Rock Art Sites | Aboriginal rock art sites include petroglyphs (incised or pecked images) and pictographs (painted images). Rock art is found on rock outcrops, cliffs, or rock shelters, but also is found on irregular boulders that range in size from a half meter to several meters in diameter. |
| Other Rock Structures, Circular Walls | Piled, stacked, or placed stone features described as unusual or unlike known feature types are included in this category. Features described as possible rings, circles, or vision quests also are included in this category. |
| Trails | Documentation of actual use of a trail or trail system during prehistoric time is difficult, and evidence used to support such use is often circumstantial. Documented use of a trail during historic times often is used to argue use during the prehistoric times. Some linear arrangements of cairns may mark trail systems. Linear clusters or concentrations of archaeological sites along prominent landforms (e.g., high ridges, river valleys) may indicate prehistoric trail use. |

### 3.10.2.2 Historic Site Types

Historic sites are cultural resources with a period of significance between approximately A.D.1700 to the present. Since features such as ditches, fences, and houses cannot be understood or interpreted outside the functional complex of which they are a part, historic resources are grouped into several themes. Table 3-34 lists the historic site types documented in the planning area.

**Table 3-34 Historic Site Types**

| Site Type | Description |
|---|---|
| Ranching | The ranching theme includes features resulting from the raising of domestic livestock, such as fences, water developments, cabins, corrals, outbuildings, roads, foundations, cattle camps, and sheepherder monuments. |
| Farming | The farming theme includes features resulting from raising crops, such as wells, windmills, barns, sheds, cisterns, farm implements, canals, ditches, and residences. |
| Mining | The mining theme includes features resulting from exploration and extraction of mineral resources such as shafts and adits, drill sites, prospect holes, tailing dumps, waste rock piles, ore bins, loading chutes, residences, and other buildings. |
| Transportation | The transportation theme includes features resulting from attempts to transport people or goods, such as abandoned rail lines, railroad grades, construction camps, bridges, roads, trails, and remains of river navigation. |
| Government Management | The government management theme includes features resulting from government attempts to manage the land and its resources. Many of these features are the result of Civilian Conservation Corps activities in the 1930s. These include dams, fences, land treatments or manipulations, spring developments, roads, fire lookouts, culverts, and bridges. |
| Military | The military theme includes features resulting from increased conflicts with native populations and trafficking of trade goods, such as military fort sites, supply depots, and fur trading posts. |

## 3.10.3 Cultural Resource Existing Conditions

A total of 1,072 cultural resources inventories have been conducted within the planning area covering 335,363 acres (approximately 4.5 percent of the planning area). These inventories include Class I (files search) and Class III (pedestrian) inventories, site testing, evaluation of NRHP eligibility, and mitigation of adverse effects through data recovery or other forms of mitigation. Most recently, the BLM completed a Class I overview of the planning area that reviewed and summarized past cultural resources investigations, the numbers and kinds of recorded resources, and cultural resources management directions (Harris et al. 2009). The information presented in this section is primarily derived from the Class I overview.

Investigations to date have recorded a total of 3,255 cultural resource sites within the planning area. This results in an average of 0.009 total sites for approximately every acre inventoried or 6.3 sites per square mile for all inventoried acres in the planning area. Of the 3,255 sites, 1,440 are prehistoric and 1,775 are historic. The distribution of the prehistoric sites recorded in the planning area averages 0.004 sites per every acre surveyed or 2.8 sites per square mile inventoried. Lithic scatters are the most numerous prehistoric site type followed by tipi ring sites and then petroglyphs. For historic sites, the average is 0.005 sites per acre inventoried or 3.4 sites per square mile inventoried. The most common historic site types include residences followed by homesteads/farmsteads, railroads/stage routes, and Euroamerican sites.

Of the 3,255 cultural resources sites recorded in the planning area, a total of 846 sites are located on BLM-administered lands. Site density is 5 sites per square mile. The dominant historic site types include homesteads/farmsteads, followed by Euroamerican sites,

railroads/stage routes, and residences. For prehistoric sites, lithic scatters are the dominant site type with petroglyphs a distant second.

### 3.10.3.1 Cultural Resource Condition and Trend

The condition and trend of cultural resources in the decision area vary considerably as a result of the diversity of terrain, geomorphology, access and visibility, and past and current land use patterns. Since recorded sites are manifested by discovery of exposed artifacts, features, and/or structures, they are easily disturbed by natural elements such as wind and water erosion, natural deterioration and decay, as well as animal and human intrusion, and development and maintenance activities. Based on limited site monitoring, the site conditions in the decision area are considered to be trending downward. Indications of active vandalism or collecting (i.e., unauthorized digging and "pothunting") have been observed in limited instances. Archaeological and historic sites are known to be deteriorating from a variety of causes. Many sites are deteriorating from natural causes and many others from the illegal activities of artifact collectors. Inadvertent damage from construction projects also impacts resources. Collectively, these agents have adversely affected and continue to adversely affect many known cultural resources.

### 3.10.3.2 Cultural Resource Consultation and Current Management

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires BLM and other federal agencies to take into account the effects of their undertakings on historic properties (i.e., cultural resources listed or eligible for listing on the NRHP), and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the ACHP. The BLM first determines whether an action is an undertaking, which is defined in Section 106 as a type of activity that could affect historic properties. If the undertaking has the potential to affect historic properties, the BLM must consult with the State Historic Preservation Office (SHPO) to determine the effects and develop appropriate mitigation. If BLM determines that the undertaking would not affect historic properties, then the agency has no further Section 106 obligations.

The BLM National Programmatic Agreement (NPA) among the BLM, ACHP, and National Conference of SHPOs defines the manner in which the BLM will meet its responsibilities under the NHPA. Day-to-day operations are based on the protocols that local BLM offices develop in each state. In Montana, the State Protocol Agreement between the BLM and Montana SHPO defines how the BLM and SHPO will interact and cooperate under the NPA and provides direction for implementing the NHPA. The BLM 8140 Manual also provides direction for protecting cultural resources from natural or human-caused deterioration and for recovering significant cultural resource data to mitigate adverse effects of proposed undertakings, in accordance with the State Protocol Agreement.

## 3.10.4 Native American Concerns

Ethnographic resources are associated with the cultural practices, beliefs, and traditional history of a community. Examples of ethnographic resources include places in oral histories or myths, such as particular rock formations, the confluence of two rivers, or a rock cairn; large areas, such as landscapes and viewscapes; sacred sites and places used for religious practices; social or traditional gathering areas, such as dance areas; natural resources, such as plant materials or clay deposits used for arts, crafts, or ceremonies; and places and natural resources traditionally used for non-ceremonial uses, such as trails or camping locations.

## 3.10.5 Ethnographic Overview

Tribes that historically occupied the planning area are believed to have entered the area during the Protohistoric Period. American Indian tribes likely present in the planning area during this period include the Cheyenne, who had reached the Black Hills by about 1780 and continued to move westward into eastern Montana. The Cheyenne originally were woodland dwellers and later became semi-sedentary agricultural people associated with the ancestors of the Mandan, Arikara, and Hidatsa. Later, the Cheyenne moved westward and became nomadic buffalo hunters on the plains. In the mid-1830s, the Cheyenne divided into northern and southern groups. The Southern Cheyenne split off to trade European goods with whites at Bent's Fort in southeast Colorado, while the Northern Cheyenne formed an alliance with the Sioux and engaged in battles against the Shoshone and Crow.

Other American Indian groups at times occupied portions of the planning area during the Protohistoric Period including the Eastern Shoshone, who occupied eastern Montana during the 1600s and 1700s. By the 1700s, the Gros Ventre and Arapaho were in western North Dakota and likely ranged through extreme eastern Montana. By the 1750s, the Gros Ventre and Blackfeet acquired the horse and guns and began pushing the Eastern Shoshone southward. With acquisition of the horse, the Blackfeet also ventured into the northern part of the planning area. The Kiowa were present in the Black Hills area in the 1500s, but eventually were pressured southward and westward by the Cheyenne, Arapaho, and Lakota Sioux. By 1790, the Kiowa had moved well south of the planning area into the Arkansas River area.

The Crow tribe has the strongest association with the planning area, which lies within their traditional homeland. In the 1500s, the Crow and their close relatives, the Hidatsa, moved west to the Missouri River in present-day North Dakota. Around 1600, the Crow separated from the Hidatsa and entered into what is now Montana. The Crow occupied the Powder and Tongue River valleys, as well as the Yellowstone valley as far west as present-day Livingston. By the 1800s, the Crow were divided into the River Crow, who lived north of the Yellowstone River in the Musselshell and Judith basins, and the Mountain Crow, who occupied the area south of the Yellowstone, particularly the Absaroka and Big Horn mountains.

One reservation, the Crow Indian Reservation, is adjacent to the planning area. Most members of the Crow tribe live on or near the reservation. The Crow Indian Reservation covers 2.2 million acres between the Wolf, Bighorn, and Pryor Mountains. U.S. Census and Tribal Enrollment records indicate there are 11,357 enrolled tribal members. Of these tribal members,

8,143 live on the reservation. Area schools, the tribal administration, the Bureau of Indian Affairs, Crow/Northern Cheyenne Indian Health Services, and private business are the primary employers on the reservation. The tribe itself owns a number of stakes in natural resources, including land, sand, gravel, water, timber, coal, oil, and methane gas.

## 3.10.6 Traditional Cultural Properties

### 3.10.6.1 Background

This plan differentiates among prehistoric cultural resources, historic cultural resources, and tribal heritage resources. Planning for historic and prehistoric cultural resources is discussed in other sections of this plan. This section deals with tribal heritage resources as defined under various authorities, including but not limited to the Federal Land Policy Management Act, the American Indian Religious Freedom Act, Executive Order 13007, the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act. Under these authorities, the BLM has the responsibility for managing tribal heritage resources, in part, by considering them in land use planning and environmental documentation, and mitigating, where possible, impacts to places or resources important to contemporary American Indians and federally recognized tribes.

Slight differences in definitions among the authorities notwithstanding, these resources can be generally defined as places or resources associated with cultural practices or beliefs of a living community that are rooted in a tribal community's oral traditions or history, and are important in maintaining the continuing cultural identity of the community. In practice, this means identifying, evaluating, and managing: a) ethnohistoric sites, b) traditional use areas, c) sacred sites and ceremonial sites, and d) traditional cultural properties.

Since tribal heritage resources are defined culturally by the people and groups that value them, these resources can only be identified and managed in consultation with the people infusing them with cultural value. In the final analysis and decision making, BLM has the legal authority to determine how these resources will be managed and what, if any, mitigation will be used to avoid unnecessary or undue impacts to these resources.

### 3.10.6.2 Tribal Consultation

As defined in BLM Manual section 8120, Tribal Consultation is a process of 1) identifying and seeking input from appropriate tribal governing bodies, 2) considering their issues and concerns, and 3) documenting the manner in which the input affects the specific management decision(s) at issue. Federally recognized tribal governments with interests in the planning area include the Blackfeet Nation, the Chippewa Cree Tribe, the Crow Tribe, the Fort Belknap Indian Community (Assiniboine and Gros Ventre), the Fort Peck Tribes (Sioux and Assiniboine), the Northern Cheyenne Tribe, the Three Affiliated Tribes: Mandan, Hidatsa, and Arikara, the Spirit Lake Sioux Tribe, the Standing Rock Sioux Tribe, the Turtle Mountain Band of Chippewa, the Lower Brule Sioux Tribe, the Rosebud Sioux Tribe of Indians, the Oglala Sioux Tribe, the Eastern Shoshone Tribe, and the Northern Arapahoe Nation.

It is important to note that consultation is a good faith effort to identify tribal issues, seek tribal input, and consider the result. There is no requirement for the Billings Field Office to do more than this and no requirement for tribes to respond to Billings Field Office's consultation efforts. The legal requirements of NEPA and other authorities seek information on many areas of tribal knowledge (cultural, religious, or traditional) that are highly confidential and not readily revealed to outsiders. At the land use planning level, tribes are reluctant to share information when they cannot see a direct threat to places and resources they value. These, and other factors, limit the available information on specific locations that could benefit from management attention. As a result, the Billings Field Office must base management on limited information, resulting in a more programmatic approach to prescribing management actions on the basis of sites and resource types.

### 3.10.6.3 Traditional Cultural Properties

The concept of traditional cultural property has created confusion when dealing with tribal heritage resources because it is commonly used to refer to all types of tribal heritage sites in all legal contexts. The term traditional cultural property was coined in National Register Bulletin 38 to refer to a property that may be eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that: a) are rooted in that community's history, and b) are important in maintaining the continuing cultural identity of the community (Parker and King 1989). Places that may be of traditional cultural importance include, but are not limited to: a rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents; locations associated with the traditional beliefs of an American Indian group about its origins, cultural history, or the nature of the world; or locations where American Indian religious practitioners go, either in the past or the present, to perform ceremonial activities based on traditional cultural rules or practice (Parker and King 1989) and ancestral habitation sites; trails; burial sites; and places from which plants, animals, minerals, and waters possessing healing powers or used for other subsistence purposes, may be taken.

Bulletin 38 has been interpreted to mean that all tribal heritage sites are traditional cultural properties and by definition eligible for the National Register. However, the Bulletin does not assert that all traditional cultural properties are eligible and it describes a process by which they can be determined to be eligible. In fact, the 1992 amendment to the National Historic Preservation Act clarified policy so that "properties of traditional religious and cultural importance to an Indian tribe may be determined to be eligible for inclusion on the National Register." Although the term traditional cultural property is not found in the National Historic

Preservation Act, or its implementing regulations, it has become important for determining eligibility for compliance with Section 106 of the National Historic Preservation Act.

There are regulatory limitations on the National Register eligibility (such as the requirement that a property be a definite location of human activity; with discernible exact boundaries; and be at least 50 years old) that limit its value in a general planning context. Because of this, the concept of traditional cultural properties will be used here only when tribes have specifically identified a resource as a traditional cultural property. This is not to say that the resources

discussed here are not eligible for the National Register and thus not subject to Section 106 of the National Historic Preservation Act. They may well be eligible even if not identified as a traditional cultural property by a tribe and subject to Section 106 as a traditional cultural property.

Within the decision area, several locations that are of traditional religious and cultural interest to tribes have been identified through coordination with tribal governments and American Indian individuals with cultural affinity to the decision area. None of the locations were specifically identified as traditional cultural properties and none have been determined eligible for the National Register as traditional cultural properties through consultation with the State Historic Preservation Office. These same locations may meet other criteria as significant ethnohistoric sites, or they may deserve consideration under the American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, or Executive Order 13007. No traditional cultural properties have been nominated but the lack of nomination does not preclude such nominations being advanced in the future.

Properties that have achieved significance only within the 50 years preceding their evaluation are not eligible for inclusion in the NRHP unless "sufficient historical perspective exists to determine that the property is exceptionally important and will continue to retain that distinction in the future." This is an extremely important criteria consideration with respect to traditional cultural values. The fact that a property may have gone unused for a lengthy period of time, with use beginning again only recently, does not make the property ineligible for the NRHP.

A Traditional Cultural Property is eligible for the NRHP only if it meets one or more of the National Register criteria. However, traditional cultural properties are usually listed under Criterion A or occasionally Criterion B for their association with historical events or broad patterns of events. Recognizing a place as eligible for the NRHP as a Traditional Cultural Property or as anything else, does not change its significance, it merely requires that the significance and value of the property be systematically considered in planning and in consultation with those who value it.

No extensive search was made to identify traditional communities other than American Indian; however, no Traditional Cultural Properties have been identified from other communities.

### 3.10.6.4 Traditional Cultural Properties Existing Conditions

Within the decision area, several geographic locations have been identified through coordination with tribal governments; however, the geographical locations either do not meet the NRHP eligibility criteria for Traditional Cultural Properties or they have not been evaluated. These geographic locations may meet other criteria as significant ethnohistoric sites, or they may deserve consideration under the American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, or Executive Order 13007 (Sacred Sites). No Traditional Cultural Properties have been formally documented and/or evaluated within the decision area.

### 3.10.6.5 Traditional Cultural Properties Condition and Trend

Since there are no Traditional Cultural Properties formally documented and/or evaluated within the decision area, no information on condition or trend of such properties is available.

## 3.11 Paleontological Resources

The BLM has authority to manage and protect paleontological resources under the Paleontological Resources Preservation Act (PRPA) of 2009 (P.L. 111-011 Title VI Subtitle D). PRPA directs the BLM to manage, protect, and preserve paleontological resources using scientific principles and expertise as well as provide for public education and awareness, scientific research, curation, and other proactive efforts.

With the passage of PRPA, the BLM now has official direction from Congress to manage paleontological resources. Prior to this, the BLM's Paleontological Resource Management policy was guided by internal policies and directives (that were subject to change) and governed by vague language in NEPA (1969) and FLPMA (1976). The BLM's Paleontological Resource Management policy, which pre-dates PRPA, is outlined in Manual Section 8270 and Handbook H-8270-1. Some portions of the documentation are superseded by BLM Instruction Memorandums: specifically IM 2008-009 supersedes Handbook section II.A.2 and IM 2009-011 supersedes Handbook sections III.A and III.B.

Paleontological resources are defined in the Paleontological Resources Preservation act as "any fossilized remains, traces, or imprints or organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth…," excluding archaeological and cultural resources (P.L. 111-011, Title VI, Subtitle D, Section 6301 et. seq.). The distribution of paleontological resources is directly related to the distribution of sedimentary geologic units exposed on the ground surface, and this relationship allows prediction of fossil potential on a formation-wide scale.

The term "fossil" refers to the remains of traces of an organism preserved by natural forces in the earth's crust. It does not include what are commonly known as "fossil fuels" such as coal, bitumen, lignite, or tar sands. Fossils are integrally associated with specific geologic formations and may occur throughout those formations. For this reason, the condition of paleontological resources is directly linked to soil and landform stability.

A Class I Overview of the BLM Billings Resource Management Plan Area: including portions of Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland, and Yellowstone Counties, Montana and portions of Big Horn County, Wyoming; Volume 2: Paleontological Resources (Hanna 2009) was written as part of this RMP/EIS. This Class I overview of paleontological resources reviewed published literature and museum records forms as the primary foundation for the paleontological overview.

## 3.11.1 Paleontological Overview

Paleontological resources consist of fossil-bearing rock formations containing information that can be interpreted to provide a further understanding about Montana's past. Fossil-bearing rock

units underlie the entire planning area. While fossils are relatively rare in most rock layers, there are seven geologic rock units within the planning area that do contain significant fossil material. Rock units that are known to contain fossils are the Tullock and Ludlow Members of the Fort Union Formation, the Judith River, Hell Creek, Morrison and Cloverly Formations, the Lakota Sandstone Formation, and the White River Group.

The Morrison, Hell Creek, Cloverly, and Lakota Sandstone formations are noted for the occurrence of dinosaur fossils. The Bridger Fossil Area ACEC, a 575-acre site located in Carbon County on BLM administered surface, contains outcrops of both the Cretaceous Period Cloverly Formation and the Jurassic Period Morrison Formation. Outcrops of the Morrison Formation within the Bridger Fossil Area ACEC have yielded the fossil remains of numerous juvenile and subadult sauropods. The Bridger Fossil Area ACEC is one of two listed National Natural Landmarks within the Billings Field Office area.

The Judith River Formation preserves the fossil record from ancient environments including shallow oceans, deltas, rivers, freshwater swamps and lakes. The Judith River Formation contains the fossil remains of plants as well as many animal species including mollusks, fish, amphibians, lizards, small mammals, dinosaurs, and other reptiles.

The Cretaceous Period Hell Creek Formation preserves the fossil record of a subtropical to tropical environment that was characterized by low plains interrupted by broad swampy bottoms and deltaic areas. Fossil remains from the Hell Creek Formation include a wide variety of plants, mollusks, fish, amphibians, reptiles, birds, small mammals, and dinosaurs. Fossil dinosaur remains include *Triceratops, Anatosaurus, and Tyrannosaurus.* The fossil record of plant and animal communities found within the Hell Creek Formation varies between low moist areas and the drier, upland plains environments that were present in the past. The Castle Butte ACEC, located in Yellowstone County within the Billings RMP area, contains outcrops of the Hell Creek Formation, which are noted for their paleontological resources.

The contact between the Cretaceous Period Hell Creek Formation and the Paleocene Tullock/Ludlow Member of the Fort Union Formation marks an important event in time. This contact represents a time of worldwide extinction for many animals, most notably the dinosaurs, and the beginning of the rapid evolution of mammals. The fossil record from the Fort Union Formation contains evidence of ancient environments that include streamside swamps, bottomlands, and well-established river courses. Fill within ancient river channels contains fossils of fresh water clams and snails. The Tullock/Ludlow Member is the primary fossil-bearing unit of the Fort Union Formation and contains fossils of turtles, fish, reptiles and mammals.

The Tertiary Period White River Group is considered an important source of fossil mammals. Although the White River Group outcrops in the planning area, the majority of the fossil-bearing areas are in the Dakotas.

## 3.11.2 The Fossil Record

A fossil is defined as the remains, trace, or imprint of a plant or animal that has been preserved in a geologic context. With proper collection and study, paleontological resources allow the reconstruction of past life on Earth. Fossilization is the exception rather than the rule, and fossils are inherently rare.

### 3.11.2.1 Vertebrate Fossils

Vertebrate fossils can occur as isolated elements, bonebeds, or individual skeletons. Isolated elements are by far the most common and include complete to partial bones and teeth. Bonebeds are concentrations of vertebrate remains (bones and teeth) in a discrete geologic layer. They can contain a wide variety of species or predominantly one species, and remains can be disarticulated, partially articulated, or fully articulated.

Microvertebrate concentrations are also called vertebrate microfossil localities or "microsites." Microsites are concentrations of small pieces of disarticulated material that are usually more resistant to weathering and transport (e.g. teeth, scales, scutes, and compact bone).

#### 3.11.2.1.1 Vertebrate Trace Fossils

According to BLM definitions, vertebrate trace fossils are considered to be vertebrate remains: "Vertebrate Fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites, gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities." Eggshells and eggs have also been classified as vertebrate trace fossils.

### 3.11.2.2 Nonvertebrate Fossils

Nonvertebrate fossils can occur alone or in association with vertebrate remains, and include invertebrates, plants (paleobotanicals), and nonvertebrate trace fossils. Plant fossils occur as leaf compressions and impressions, petrified wood, seeds, cones, spores, pollen, and amber. Nonvertebrate trace fossils include plant casts and molds (e.g. root casts, seed molds) and invertebrate traces.

### 3.11.2.3 Paleontological Localities

A total of 501 paleontological localities are documented to occur in the Billings Field Office planning area. The paleontological resources occur in all counties, and the 501 documented localities are distributed as follows:

- Big Horn, Montana = 3
- Big Horn, Wyoming = 31
- Carbon = 240
- Golden Valley = 15
- Musselshell = 45

- Stillwater = 8
- Sweet Grass = 65
- Wheatland = 69
- Yellowstone = 25

Land ownership is known for 446 of the 501 documented paleontological localities, which is as follows:

- BLM = 184
- BLM/private = 13
- State = 17
- State/private = 5
- Private = 227

Legal descriptions for the remaining 55 localities were either unavailable, unknown, or could not be determined. The majority of paleontological documented in the Billings Field Office planning area for which land ownership is known occur on private surface ownership.

Of the 501documented paleontological localities, 380 are vertebrate fossil localities and 121 are nonvertebrate (invertebrate or paleobotanical) localities. Some vertebrate localities may also contain invertebrate, paleobotanical, or trace fossil material.

### 3.11.2.4 Potential Fossil Yield Classification

The Potential Fossil Yield Classification (PFYC) system (WO-IM-2008-009) is used to classify paleontological resource potential on public lands in order to assess possible resource impacts and mitigation needs for federal actions involving surface disturbance, land tenure adjustments, and land-use planning. This classification system is based on the potential for the occurrence of significant paleontological resources in a geologic unit and the associated risk for impacts to the resource based on federal management actions. It uses geologic units as base data.

The PFYC system predicts the potential occurrence of paleontological resources based on the distribution of geologic units. This is possible because the potential for paleontological resources is directly related to the distribution of sedimentary geologic units exposed on the ground surface. Consequently, this relationship allows the prediction of fossil potential on a formation –wide scale. Each formation contains its own suite of fossil types, and can be classified according to its potential fossil yield as Class 1, Class 2, Class 3, Class 4, or Class 5 (Table 3-35).

**Table 3-35 Potential Fossil Yield Classification**

| PFYC Class | Potential |
|---|---|
| Class 1 | Very Low Potential for Paleontological Resources |
| Class 2 | Low Potential for Paleontological Resources |
| Class 3 | Moderate (3a) or Unknown Potential (3b) for Paleontological Resources |

| | |
|---|---|
| Class 4 | High Potential for Paleontological Resources |
| Class 5 | Very High Potential for Paleontological Resources |

Assignment of these classes provides a foundation for general management decisions and new project planning, by indicating what level of management concern is warranted. The PFYC system can also be used to predict if proposed projects should include paleontological resource assessment or mitigation. Table 3-36 breaks out the PFYC acres for the planning area, BLM administered surface, and BLM administered federal mineral estate (also see Map 35).

**Table 3-36 Potential Fossil Yield Classification Acres**

| | Class 1 | Class 2 | Class 3a | Class 3b | Class 4 | Class 5 |
|---|---|---|---|---|---|---|
| PFYC Acres Billings Field Office Planning Area | 582,841.7 | 2,814,621.8 | 2,463467.0 | 399,230.5 | 162,746.4 | 4,207,664.2 |
| PFYC Acres BLM Administered Surface | 8,349.4 | 110,430.9 | 62,696.4 | 20,421.7 | 10,941.5 | 216,910.6 |
| PFYC Acres BLM Administered Federal Mineral Estate | 46,754.5 | 143,442.5 | 125,503.2 | 37,115.3 | 18,939.4 | 297,154.5 |

The potential for paleontological resources is directly related to the distribution of sedimentary geologic units exposed on the ground surface, and this relationship allows prediction of fossil potential on a formation-wide scale. Sedimentary geological deposits of Precambrian (Proterozoic Period), Paleozoic (Cambrian, Ordovician, Devonian, Mississippian, Pennsylvanian, and Permian periods), Mesozoic (Triassic, Jurassic, and Cretaceous periods), and Cenozoic (Tertiary and Quaternary periods) age occur within the BLM Billings Field Office planning area boundaries. Each geologic unit contains it own suite of fossil types, and is classified according to its paleontological potential using the BLM's Potential Fossil Yield Classification (PFYC) system. These classes provide a foundation for general management decisions, and new project planning, by indicating what level of management concern is warranted (Table 3-37).

**Table 3-37 Geologic Formations Present in the Planning Area**

| Formation Age | Formation Name | Management Concern | Potential Fossil Yield Classification |
|---|---|---|---|
| Precambrian Belt Supergroup | Helena Formation | Very low | Class 1 |
| | Wallace Formation | Very low | Class 1 |
| Cambrian | Flathead Formation | Low | Class 2 |
| | Wolsey Formation | Low | Class 2 |
| | Meagher Formation | Low | Class 2 |
| | Park Formation | Low | Class 2 |
| | Pilgrim Formation | Low | Class 2 |
| | Snowy Range Formation | Low | Class 2 |

**Table 3-37 Geologic Formations Present in the Planning Area**

| Formation Age | Formation Name | Management Concern | Potential Fossil Yield Classification |
|---|---|---|---|
| | Grove Creek Formation | Low | Class 2 |
| Ordovician | Bighorn Dolomite | Moderate | Class 3(b) |
| Devonian | Maywood Formation | Low | Class 2 |
| | Birdbear Formation | Low | Class 2 |
| | Three Forks Formation | Low | Class 2 |
| | Beartooth Butte Formation | Moderate | Class 3(a) |
| | Jefferson Limestone | Moderate | Class 3(b) |
| Mississippian | Kibbey Formation | Low | Class 2 |
| | Charles Formation | Low | Class 2 |
| | Mission Canyon Formation | Low | Class 2 |
| | Lodgepole Formation | Low | Class 2 |
| | Otter Formation | Low | Class 2 |
| | Heath Formation | Very High | Class 5 |
| Pennsylvanian | Amsden Group | | |
| | Tyler Formation | Moderate | Class 3(b) |
| | Alaska Bench Formation | Moderate | Class 3(b) |
| | Devils Pocket Formation | Low | Class 2 |
| | Quadrant (Tensleep) Formation | Low | Class 2 |
| Permian | Phosphoria Formation | Moderate | Class 3(b) |
| Triassic | Chugwater Formation | Low | Class 2 |
| | Dinwoody Formation | Low | Class 2 |
| Jurassic | Ellis Group (undivided) | | |
| | Piper (Gypsum Spring) Formation | Low | Class 2 |
| | Rierdon (lower Sundance) Formation | High | Class 4 |
| | Swift (upper Sundance) Formation | Moderate | Class 3(b) |
| | Morrison Formation | High | Class 4 |
| Cretaceous | Cloverly/Kootenai Formation | Very High | Class 5 |
| | Greenhorn Formation | Low | Class 2 |
| | Carlile Formation | Low | Class 2 |
| | Fall River Sandstone | Moderate | Class 3(a) |
| | Thermopolis Shale | Moderate | Class 3(a) |
| | Mowry Shale | Moderate | Class 3(a) |
| | Telegraph Creek Formation | Moderate | Class 3(b) |

**Table 3-37 Geologic Formations Present in the Planning Area**

| Formation Age | Formation Name | Management Concern | Potential Fossil Yield Classification |
|---|---|---|---|
| | Livingston Formation | High | Class 4 |
| | Belle Fourche Shale | Moderate | Class 3(a) |
| Cretaceous *(continued)* | Frontier Formation | Low | Class 2 |
| | Niobrara Formation | Moderate | Class 3(a) |
| | Eagle Sandstone | Moderate | Class 3(a) |
| | Claggett Shale | Moderate | Class 3(a) |
| | Judith River Formation | Very High | Class 5 |
| | Bearpaw Shale | Moderate | Class 3(a) |
| | Hell Creek (Lance) Formation | Very High | Class 5 |
| | Lennep Formation | Low | Class 2 |
| Tertiary | Sedimentary deposits | High | Class 4 |
| | Wasatch Formation | Moderate | Class 3(a) |
| | Fort Union Formation | Very High | Class 5 |
| Quaternary-Tertiary | Terrace deposits | Low | Class 2 |
| Quaternary | Alluvium | Low | Class 2 |
| | Glacial deposits | Low | Class 2 |
| | Glacial lake deposits | Moderate | Class 3(a) |
| | Cave deposits | High | Class 4 |

### 3.11.2.5 Paleontological Resource Condition and Trend

Paleontological localities are areas of known paleontological resources with defined boundaries, usually associated with excavation and data recovery efforts (e.g., Mother's Day Site, Crooked Creek Natural Area, Crooked Creek Natural Area National Natural Landmark, Bridger Fossil Area ACEC, and Bridger Fossil Area National Natural Landmark). A comprehensive paleontological inventory has not been carried out for the decision area; nevertheless, academic and private industry personnel have studied paleontological resources in various contexts. At least 40 groups and institutions from the 1850s to present have collected fossils in the planning area. Fossils recovered from these localities represent a diverse array of paleobotanicals, invertebrates, and vertebrates. Scientific activity has occurred during the past several years, and there are currently active paleontological use permits issued for the public lands in the planning area.

The BLM identifies the following use or value categories for paleontological sites: scientific, educational, and recreational. BLM permit requirements emphasize the scientific value of vertebrate remains, and a permit is required for collection of vertebrate remains and trace

fossils. In addition, a permit is required for the collection of scientifically significant invertebrate and plant paleontological resources. In conjunction with their scientific use, some educational uses of vertebrate fossils are appropriate. For example, many BLM Paleontological Resources Use Permit holders involve students during data collection, specimen recovery, and preparation. Federally owned fossils can also be used in exhibits or as teaching aids. All paleontological resources remain federal property whether in situ or in a museum collection. Collection of any paleontological resources on BLM managed public lands cannot occur without a permit. The exception is for casual collecting of common invertebrate and plant paleontological resources on BLM managed lands for recreational purposes. Casual collecting is defined by the PRPA as the collecting of a reasonable amount of common invertebrate and plant paleontological resources for non-commercial personal use, either by surface collection or the use of non-powered hand tools resulting in only negligible disturbance to the earth's surface and other resources. However, some fossilized nonvertebrates and plants are rare or exceptionally preserved and require a permit for collection.

Potential threats to paleontological resources include natural erosion, and various anthropogenic activities, such as ground disturbance and illegal collection/excavation.

#### 3.11.2.6 Paleontological Resource Management on Public Lands

The increasing economic value of fossils puts paleontological resources on public lands at risk, and unauthorized collection of vertebrate fossils is becoming more common. The badlands of Montana are remote and rugged, and public lands in these areas are often targeted by unauthorized collectors. The scientific integrity of paleontology is compromised more every year, as specimens are often hastily excavated and permanently removed from the scientific realm, ending up in private collections. As the sale of fossils continues and their economic value increases, there is a heightened urgency for protection and management of paleontological resources on public lands. Fines for theft of public property ($500) have not been much of a deterrent for illegal collection activities on public lands. However, recent passage of the PRPA should help deter such activities, as it standardizes and significantly increases criminal penalties for theft of fossils from federally owned lands and provides for civil penalties concurrently.

## 3.12 Visual Resources

The management system for visual resources begins with a process which evaluates landscapes according to three factors: scenic quality/visual appeal, sensitivity/public concern for scenic quality, and distance from the observer.

It is important to note that Visual Resource Management (VRM) is based on human perceptions and expectations in the context of the existing landscape. In order to meet its responsibility to maintain the scenic values of the public lands, BLM has developed a VRM system that addresses the following:

- Different levels of scenic values require different levels of management. For example, management of an area with high scenic value might be focused on preserving the

existing character of the landscape, and management of an area with little scenic value might allow for major modifications to the landscape. Determining how an area should be managed first requires an assessment of the area's scenic values.

- Assessing scenic values and determining visual impacts can be a subjective process. Objectivity and consistency can be greatly increased by using the basic design elements of form, line, color, and texture, which have often been used to describe and evaluate landscapes, to also describe proposed projects. Projects that repeat these design elements are usually in harmony with their surroundings; those that don't create contrast. By adjusting project designs so the elements are repeated, visual impacts can be minimized.

While there are BLM guidelines for the visual resource inventory (BLM Manual H-8410-1) and determining visual contrast ratings (BLM Manual 8431), the guidance provided is general in nature in order to enable application to different ecosystems and social climates. The inventory and management of visual resources addresses BLM Administered Surface Lands only.

## 3.12.1 Visual Resources Management

Once inventoried, Landscapes are then placed into one of four VRM classes to determine appropriate techniques and strategies for maintaining visual quality, each of which has its own management objectives:

Class I Objective: The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. It would be very difficult to get a new project approved in this class, unless it is completely shielded from view.

Class II Objective: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. New projects can be approved if they blend in with the existing surroundings and don't attract attention (i.e., small-scale picnic area or primitive campground in valley shielded from view that blends with natural appearance).

Class III Objective: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. New projects can be approved that are not large scale, dominating features (i.e., geothermal powerplant or major mining operation would not be approved).

Class IV Objective: The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. Most new projects would likely be approved in regards to a VRM perspective.

Scenic quality is an essential component of most recreation activities. A recent survey of out of state visitors conducted by The University of Montana's Institute for Tourism and Recreation Research (ITRR) indicated the majority of respondents (over 50 percent) visited Montana for its uncrowded, wide open spaces, and mountains and streams. Additionally, of those surveyed, driving for pleasure (45 percent) was the primary attraction, and wildlife viewing was close behind at 30 percent.

There are many areas in the BiFO decision area that possess a high degree of scenic quality and a high level of visual sensitivity. In general, high scenic quality in the BiFO occurs in locations where the area has varied topography, unique geology, and striking vistas. High visual sensitivity areas are those with a high degree of visitor interest and public concern for an area's visual resources, an area's high degree of public visibility, and the level and type of public use.

The BiFO conducted an inventory of the scenic quality of much of the individual land parcels it manages in 2007, but does not have a complete landscape wide inventory. Table 3-38 displays current VRI classes, associated objectives, and the number of BLM administered surface acres for each class. This information represents findings from the VRI; VRM classes will be (re)assigned through the RMP process

**Table 3-38 VRM Classes and Acreage**

| Current VRM Classes and Acreage | |
|---|---|
| VRM Class I (includes Special Areas – WSAs) | 29,843 acres |
| VRM Class II | 12,427 acres |
| VRM Class III | 390,602 acres |
| VRM Class IV | 816 acres |

By policy, VRM Class I areas are designated for all WSAs in the decision area. These areas are remote with limited access and have no developed facilities. For areas rated VRM Class I, modifications to the landscape should not be evident or attract attention, and the landscape's natural appearance should be preserved.

Some areas adjacent to the WSAs in the Pryor Mountains maintain a VRM Class II management class. These areas are typically rated high in the inventory process because of their scenic qualities. The Weatherman Draw and Meeteetse Spires ACECs and Bad Canyon are also managed at the VRM Class II level for their unique scenic quality. The VRM Class II areas are managed to retain the landscape's existing character. Activities or modifications to the area should not be evident or attract attention from the casual observer. Changes should repeat

the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Most of the BiFO decision area landscape transitions from largely grass and sage covered rolling hills to more rugged sandstone outcrop features. These areas are scattered among private, local, state, and federally owned lands. Ponderosa pine and junipers break up the landscape. While these areas possess some natural beauty, they are not unique and are managed as VRM Class III. Levels of change in VRM Class III areas should be moderate, and management activities may attract attention but should not dominate a casual observer's view or detract from the existing landscape.

The Bridger Fossil Area ACEC and Petroglyph Canyon ACEC are currently managed as VRM Class IV. AVRM Class IV rating is generally reserved for areas where the visual intrusions dominate the viewshed, but are in character with the surrounding landscape (areas such as rural communities, multiple subdivisions, and mining developments) not as in this case, landscapes in a generally natural condition being managed for fragile and rare resources.

## 3.12.2 Visual Resource Management Analysis Process

To properly assess the contrasts between a proposed and the existing Landscape situation, it is necessary to break each down into the basic features (i.e., landform/water, vegetation, and structures) and basic elements (i.e., form, line, color, and texture) so that the specific features and elements of a project that cause contrast on a landscape can be accurately identified.

The following general criteria and factors are used when rating the degree of contrast:

| Degree of Contrast | Criteria |
|---|---|
| None | The element contrast is not visible or perceived. |
| Weak | The element contrast can be seen but does not attract attention. |
| Moderate | The element contrast begins to attract attention and begins to dominate the characteristic landscape. |
| Strong | The element contrast demands attention, will not be overlooked, and is dominant in the landscape. |

The following factors apply when applying the criteria:

1. *Distance*. The contrast created by a project usually is less as viewing distance increases.
2. *Angle of Observation*. The apparent size of a project is directly related to the angle between the viewer's line-of-sight and the slope upon which the project is to take place. As this angle nears 90 degrees (vertical and horizontal), the maximum area is viewable.

3. *Length of Time the Project Is In View*. If the viewer has only a brief glimpse of the project, the contrast may not be of great concern. If, however, the project is subject to view for a long period, as from an overlook, the contrast may be very significant.

4. *Relative Size or Scale*. The contrast created by the project is directly related to its size and scale as compared to the surroundings in which it is place.

5. *Season of Use*. Contrast ratings should consider the physical conditions that exist during the heaviest or most critical visitor use season, such as snow cover and tree defoliation during the winter, leaf color in the fall, and lush vegetation and flowering in the spring.

6. *Light Conditions*. The amount of contrast can be substantially affected by the light conditions. The direction and angle of lighting can affect color intensity, reflection, shadow, from, texture, and many other visual aspects of the landscape. Light conditions during heavy periods must be a consideration in contrast ratings.

7. *Recovery Time*. The amount of time required for successful revegetation should be considered. Few projects meet the VRM management objectives during construction activities. Recovery usually takes several years and goes through several phrases (e.g., bare ground to grasses, to shrubs, to trees, etc.).

8. *Spatial Relationships*. The spatial relationship within a landscape is a major factor in determining the degree of contrast.

9. *Atmospheric Conditions*. The visibility of projects due to atmospheric conditions such as air pollution or natural haze should be considered.

10. *Motion*. Movement such as waterfalls, vehicles, or plumes draws attention to a project.

The level of contrast is compared to the objectives for the approved VRM Class. For comparative purposes, the four levels of contrast (i.e., none, weak, moderate, and strong) roughly correspond with VRM Classes I, II, III, and IV, respectively. This means that a "strong" contrast rating may be acceptable in a Class IV area but probably would not meet the VRM objectives for a Class III area. In making these comparisons, the cumulative effect of all the contrast ratings must be considered. Certain combinations of ratings may indicate there is a stronger overall contrast that the individual ratings show. For example, several "moderate" ratings when viewed in combination may warrant an overall "strong" rating. This is a judgment call that is made by resource specialists.

## 3.13 Fire Ecology and Management

Fire is a natural phenomenon. Vegetation communities in the planning area have adapted to the presence or absence of wildfire over several thousand years. Geographic, topographic, elevational, and climatic variances throughout the planning area provide a range of conditions in which fire has historically (from 200 to 400 years ago) affected vegetation differently.

Consequently forests, woodlands, and rangelands throughout the planning area have adapted to fire.

Wildfire risk is predicted to increase due to a combination of climate change effects on temperature, precipitation, and wind. Together, these climate characteristics affect fuel availability and fuel moisture content. In Montana, the increase in median annual area burned is predicted to be an increase of 241 percent to 515 percent (Climate Change Supplementary Information Report for the Montana, North Dakota and South Dakota Bureau of Land Management, 2010).

## 3.13.1Wildfire Occurrence

Yearly fire occurrence data for the BiFO is available from 1984 to 2010 (Map 36 – Wildland Fire Locations). Between 1984 and 2010, 336 fires occurred on public lands in the planning area. Approximately 60 percent of the fires were lightning caused, and 40 percent were human caused. These fires typically occurred between May and August. Human caused fires were usually associated with main travel corridors and occurred year round at various intensities. Multiple fires have also occurred on the same day.

The number of fires in the planning area varies from year to year and is dependent on the amount of moisture associated with lightning producing thunderstorms. Natural fire return intervals for lower to middle elevation communities comprise approximately 84 percent of the BiFO planning area, and high elevation communities make up another 16 percent of the area. Fire size fluctuates from year to year depending on the availability of the primary fire carrier. Annual grasses and brush are the primary fire carriers in the lower to middle elevations, and their growth is dependent upon precipitation received during the late winter and spring months. At higher elevations, primary fire carriers are pine needles and litter. Table 3-39 identifies only fires that occurred on BLM lands. While the majority of the planning area experiences primarily Class A, B, and C fires, the area has a history of large fire activity. Ten Class E and F fires ranging from 300 to 54,000 acres have been recorded. Table 3-40 shows causes of fires between 1894 and 2010, and Table 3-41 provides information on large-scale fire activity in the planning area from 1999-2010.

### Table 3-39 Fires by Class Size

| Fires by Class Size | | 1984-2010 |
|---|---|---|
| **Class** | **Size** | **Number of Fires** |
| A | <.25 acres | 63 |
| B | .25 – 10 acres | 115 |
| C | 10 – 100 acres | 77 |
| D | 100 – 300 acres | 32 |
| E | 300 – 1,000 acres | 18 |
| F | 1,000 – 5,000 acres | 13 |
| G | > 5,000 acres | 7 |
| Control | No control acres reported | 11 |
| | **TOTAL** | **336** |

**Note:**
Source: https://www.nifc.blm.gov/cgi/WfmiHome.cgi

### Table 3-40 Fires by Cause

| Fires by Cause | Number of Fires 1984-2010 |
|---|---|
| Human | 159 |
| Natural | 177 |
| **TOTAL** | **336** |

**Note:**
Source:

### Table 3-41 Fire Activity in the Planning Area Since 2000

| Year | Fire Name | Acres (all ownerships) |
|---|---|---|
| 2000 | Twin Coulee | 3,000 |
| 2002 | Steamboat Butte | 3,000 |
| 2002 | Cow Creek | 5,500 |
| 2002 | Red Waffle | 6,000 |
| 2003 | Hobble | 36,180 |
| 2004 | Pine Hill | 2,022 |
| 2005 | Cottonwood Creek | 3,485 |
| 2006 | Bundy Railroad | 91,897 |
| 2006 | Suanders | 3,150 |
| 2006 | Emerald Hills | 3,900 |

| Year | Fire Name | Acres (all ownerships) |
|---|---|---|
| 2006 | Pine Ridge | 121,687 |
| 2006 | Jungle | 36,000 |
| 2006 | Derby | 199,500 |
| 2007 | Chi Chi | 17,954 |
| 2008 | Dunn Mountain | 102,383 |
| 2010 | Stump Gulch | 9,870 |

**Note:**
Statistics from http://dnrc.mt.gov/FireReports and https://www.nifc.blm.gov/cgi/nsdu/FireReporting.cgi

## 3.13.2 Fuels Treatments

Fuels treatments such as prescribed burns are developed to reduce fuels and meet resource objectives in wildland urban interface (WUI) areas and non-WUI areas. A combination of mechanical, hand, and fire treatments are used to accomplish these objectives. The principle objective is to reduce risk from wildfire to life, property, critical infrastructure, and natural resources in wildland urban interface areas. Priority of fire management activities would be placed on fuels reduction in WUI areas in conjunction with completed county wildfire protection plans (CWPPs). All counties within the planning area have developed CWPPs. The principal objective of these CWPPs is to reduce the risk from wildfire to life, property, critical infrastructure, and natural resources in the WUI areas. As directed by the Healthy Forests Restoration Act of 2003 (HFRA), these plans identify and prioritize areas for hazardous fuel reduction treatments. This legislation allows the BLM to work cooperatively with counties to consider the priorities of local communities as hazardous fuel reduction and forest management projects are being developed and implemented. Table 3-42 summarizes fuels reduction work in the decision area.

**Table 3-42 Fuels Treatments from 2003-2010**

| Treatment Type | Acres/year (2003-2010) | Contract/Federal | Cost/Acre | Totals/Year |
|---|---|---|---|---|
| Mechanical Treatment (WUI & Non-WUI) | 651 | 50% Contract<br>50% Federal | $400/acre<br>$300/acre | $130,200<br>$ 97,650 |
| Prescribed Fire WUI | 395 | Federal | $15/acre | $ 5,925 |
| Prescribed Fire Non-WUI | 1,095 | Federal | $20/acre | $ 21,900 |
| **TOTAL** | **2,141** | | | **$255,675** |

## 3.13.3 Fire Regimes and Condition Causes

Fire regimes address the nature of disturbance by fire by describing historic intensity, frequency, and effect on vegetation. Knowledge of fire regimes is a critical component in managing landscapes and analyzing changes in fire frequencies and intensities. Table 3-43 lists

the natural fire regimes by which vegetation is classified in the BiFO. Natural fire return intervals for lower-to-middle elevation communities' compose approximately 84 percent of the field office and high elevation communities make up 16 percent of the field office. Categorization of vegetation types by fire regimes was based on information provided in Section 3.3.5 – Vegetative Communities and Section 3.4.5 - Forestry.

**Table 3-43 Fire Regime Classifications and BiFO Estimated Acreage**

| Fire Regime | Fire Return Interval | Severity Level | BiFO |
|---|---|---|---|
| I | 0 – 35 Years | Common Surface Fire | 68,366 acres or 16% |
| II | 0 – 35 Years | Stand Replacement Fires High Severity | |
| III | 35 – 100+ Years | Mixed Severity Fires | 358,924 acres or 84% |
| IV | 35 – 100+ Years | Stand Replacement Fires High Severity | |
| V | 200+ Years | High Ratio of Stand Replacement Fires | |

**Note:**
Source: BLM BiFO Fire Management Plan (2004)

## 3.13.4 Frequency Fire Intensity Estimated

Related to fire, vegetation conditions are evaluated by the degree of departure from fire regimes that a specific vegetation community demonstrates. Departure from fire regimes is indicated by changes to key ecosystem components (species composition, structural stage, stand age, canopy closure, and fuel loadings). Degree of departure is ranked using three condition classes that categorize vegetation communities by evaluating the difference between their historic fire regime and related indicating characteristics, and their current condition and its indicating characteristics. Basically, fire regime "condition classes are a qualitative measure describing the degree of departure from historical fire regimes" (Schmidt K.M. et al. 2002). Table 3-44 illustrates the estimated acreage of vegetation in the planning area in each condition class.

**Table 3-44 Fire Regime Condition Class Description and BiFO Estimated Acreage**

| Condition Class | Percent Deviation from Natural | BiFO Area (estimated acres) |
|---|---|---|
| I | 0 – 33% | 21,879 acres or 5% |
| II | 34 – 66% | 109,825 acres or 26 % |
| III | 67 – 100% | 295,586 acres or 69% |

**Note:**
Source: BLM BiFO Fire Management Plan (2004)

## 3.13.5 Condition

Areas in Condition Classes 2 and 3 are of most concern because they often need management intervention before allowing fire to return naturally.

## 3.14 Wilderness Characteristics

Even before the WSAs were established in the 1980s, designation of wilderness has become a prominent state and national issue. For more than 50 years, the public has debated which lands have wilderness characteristics and should be considered by Congress for wilderness designation.

Pursuant to the section 201 of the Federal Land Policy and Management Act of 1976 (FLPMA), 43 U.S.C. § 1712(c), the BLM, does have the authority to conduct inventories for characteristics associated with the concept of wilderness and to consider management of these values in its land use planning process.

Some key points to this management direction are:

- Protection of wilderness characteristics is a high priority for BLM and is an integral component of the BLM's multiple use mission
- BLM can establish management prescriptions to protect wilderness characteristics and manage these lands through the planning process unless it is determined that impairment is appropriate and consistent with other laws and other resource considerations
- The BLM has an obligation to maintain wilderness resource inventories and must keep them current
- BLM will develop recommendations with public involvement, regarding possible designation of these lands into the National Wilderness Preservation system

Thus, this section addresses lands outside existing WSAs that have been identified as having wilderness characteristics.

Non-WSA lands with wilderness characteristics are those that have the appearance of naturalness and outstanding opportunities for solitude or primitive and unconfined recreation, and also comprise an area of 5,000 acres, or areas less than 5,000 acres that are contiguous to designated wilderness, WSAs, or other administratively endorsed for wilderness management lands, or, in accordance with the Wilderness Act's language, areas "*of sufficient size as to make practicable its preservation and use in an unimpaired condition, including roadless islands*." BLM used the same criteria for determining wilderness characteristics as in the 1979 wilderness inventory. The 5,000-acre value was helpful to BLM in making preliminary judgments, but it was not considered a limiting factor. The size criterion of 5,000 acres was applied only to standalone units, that is, units not contiguous with other federal lands previously determined to possess wilderness characteristics (e.g., WSAs and NPS and USFS lands that are administratively endorsed for wilderness).

Units contiguous with federal lands with wilderness characteristics were evaluated for all wilderness characteristics found in the inventoried area. The presence of outstanding levels for opportunities for solitude or primitive recreation was evaluated as well. Detailed information

about non-WSA lands with wilderness characteristics is part of the administrative record for this Draft RMP/EIS (See Appendix K for details).

The wilderness characteristics review process involved a BLM interdisciplinary team that reviewed available information and followed up with field trips where necessary. The BLM interdisciplinary team evaluated information provided by the public about these areas, their on-the-ground knowledge of these areas, information in case files and field files, master title plats, aerial photos, GIS data layers, and field inspections, and determined that all or parts of several areas have wilderness characteristics.

In summary, the BiFO does not manage any congressionally designated wilderness areas and does manage four WSAs. Beyond these, currently, the BiFO manages five tracts as non-WSA lands with wilderness characteristics (Map 42).

In the Wilderness Review, there were several areas greater than 5,000 contiguous acres of BLM-administered lands that met the Lands with Wilderness Character evaluation criteria. Tracts of public lands adjacent to the Bighorn Tack-on, the Burnt Timber, and the Pryor Mountain WSAs were analyzed and found to possess wilderness character. An area including recently acquired lands adjacent to and including the Meeteetse Spires ACEC, also met the criteria, as did a parcel adjacent to the Gallatin/Custer National Forest known as the Bad Canyon Unit. A stand-alone land tract, the Weatherman Draw Unit, most of which is currently designated as an ACEC was also found to possess wilderness characteristics. Summarized below is a description of each inventory unit.

## 3.14.1 Pryor Mountain Unit

Much of the lands were initially inventoried as portions of what became two separate WSAs, the Pryor Mountains and the Big Horn Tack-On WSAs. At the time human impacts were recorded which eliminated them from consideration. Other lands were acquired after the initial inventory was concluded:

A portion of Tract 1 was previously inventoried and found to possess wilderness values, but another portion of this Tract (T. 8 S., R., 28 E., Section 16 – 640 acres) was acquired after the inventory and had not been previously evaluated. Some lands (154 acres) in Section 1 have also never been inventoried since they were previously isolated by the acquired lands. This parcel is approximately 2,873 acres in size. This parcel is separated from The Pryor Mountain WSA by an established road (Sykes Ridge Road) but is adjacent to the Big Horn Tack-On WSA to the south and lands administratively endorsed for wilderness designation by the NPS in the Bighorn Canyon National Recreation Area to the southeast. Private lands form the northern boundary and the west boundary is a combination of a vehicle road, private lands, and Custer National Forest lands.

Tracts 2 and 3 (T., 9 S., R 28 E., Section 16 - 640 acres) were not previously inventoried for wilderness character since they were acquired after the inventory effort. They were subsequently recommended for potential wilderness designation in the Montana Statewide Wilderness Study Report (1991) and were noted as being outside the WSA. Tract 2 is

approximately 497 acres in size. It is adjacent to the Pryor Mountain WSA to the west, south and north, while the Sykes Ridge road forms the boundary to the east. Tract 3 is approximately 143 acres in size. It is adjacent to the Big Horn Tack-On WSA on the north, east, and south sides. The west side is the Sykes Ridge road.

Tracts 4, 5 and 7 were recommended for wilderness designation in the Montana Statewide Wilderness Study Report (1991) and were noted as being outside the WSAs. However, they were not inventoried for wilderness character.

Tract 4 is approximately 445 acres in size. The parcel boundary is formed by vehicle routes on all sides. It was initially unclear whether the two boundary routes were roads, trails or a combination of both. If either vehicle route were found not to be a road, then the tract would be adjacent to the Pryor Mountains WSA or the Big Horn Tack-On WSA.

Tract 5 is an irregular shape and the boundary is formed by a combination of vehicle routes and a ROW. It is approximately 512 acres in size with 224 acres in Wyoming and 288 acres in Montana. The Pryor Mountain WSA is located to the west and the Big Horn Tack-on WSA is located to the east. It was initially unclear whether the two routes were roads or trails or a combination of both. If either one of the two boundary vehicle routes were determined to be a way, then the tract would be adjacent to the Pryor Mountains WSA or the Big Horn Tack-On WSA. BLM has determined that the vehicle route to the east is not a road and that the Tract is adjacent to the Big Horn Tack-On WSA.

Tract 7 is located adjacent to the Pryor Mountains WSA on the north, east, and south. The west side boundary is a county road (Burnt Timber Road). It is approximately 327 acres in size.

Tracts 6 and 8 were previously inventoried by BLM and found to lack wilderness character. It was noted in the Final Decision, Montana Wilderness Inventory, (1980), that the lands now in Tract 6 had a power line, a portion of a stock trail, a vehicle routes used to view wild horses, and some small uranium mining scars. Tract 6 is located adjacent to the Pryor Mountains WSA to its north. It is approximately 1,074 acres in size and is completely within Wyoming. The boundary is either a county maintained road or a powerline ROW to the south, east, and west.

The lands now in Tract 8 were noted as having extensive uranium mining scars and other development impacts. Tract 8 is located adjacent to the Pryor Mountains WSA on the north, east, and south. The western boundary is a county road (Burnt Timber Road). The Tract is approximately 269 acres in size.

In this effort, BLM determined that the lands, with the exception of Tract 4, taken together with the adjacent and contiguous BLM WSA lands and NPS lands recommended for wilderness designation, meet the size exception criteria. The lands have minimal intrusions, as noted above, and are substantially in a natural condition, with the exception of small portions of Tracts 1 and 5, which have been excluded from the Inventory Unit. All of Tract 8 still has extensive mineral development and exploration impacts and lacks naturalness.

There is abundant vegetation screening and topographical aspects which taken together with minimal vehicle use, which is also restricted to designated routes outside of the inventory

tracts, and general low use numbers offers challenging recreational opportunities for hiking, climbing, wildlife viewing, and hunting. There are numerous natural limestone caves and karsts which offer a range of caving opportunities and which are advertised.

The tracts, especially when considered with the adjacent WSAs and NPS lands, offer expansiveness and sequestration of an outstanding level. The lands possess the following significant resources documented in the Billings RMP and the Montana Statewide Wilderness Report (1991): wildlife, plant, geology, scenery and cultural.

The wild horse herd is a significant attractant and is known internationally. All wild horse management operations conducted on the PMWHR have been analyzed for potential impacts to wilderness values through the development of NEPA documents. None have caused detrimental effects. The occasional removal of the wild horses occurs when the population exceeds its carrying capacity and begins to damage the natural condition so the operation is considered to have beneficial aspects for the wilderness values. Similarly, the construction of the localized water developments spreads the wild horse population throughout the area and reduces potential adverse impacts throughout the range.

## 3.14.2 Burnt Timber Canyon Unit

The initial study area in the 1979 effort included public lands in Wyoming as well as public lands in Montana. Initially the entire area was found to be lacking wilderness characteristics, but upon appeal it was revaluated and a central core area was eventually designated as the Burnt Timber Canyon WSA in 1991.

The new inventory addressed the public lands adjacent to the WSA, which were the lands in Montana, found to be lacking wilderness values in the earlier effort. The adjacent public lands in Wyoming were not re-inventoried.

Tract 1, approximately 1,816 acres in size, is adjacent to the Burnt Timber Canyon WSA on its west side, separated from it by a very primitive vehicle route which is mostly unused, except on a random basis by OHVs. This route is naturally rehabbing but can be found and followed. The rest of the west side boundary is a combination of private/public lands. The east side boundary is formed by the Burnt Timber Road. Tract 1 is less than 5,000 acres in size but is adjacent to the WSA and thus qualifies for evaluation under the size exception at BLM Manual 6310.

Tract 2, approximately 5,388 acres in size, has the Cottonwood Creek road as its western boundary, while the east side is adjacent to the Burnt Timber Canyon WSA. This boundary is a combination of a primitive vehicle route which is mostly unused, except by OHV's and which is naturally rehabbing, and private/public lands. The southern boundary is the Montana/Wyoming state line. Tract 2 is more than 5,000 acres in size and is also adjacent to the WSA and thus qualifies for evaluation under BLM Manual 6310. 3.1.4.

Tract 1 has less vehicle use on the previously identified vehicle routes, with the exception of the portion of the vehicle route which BLM has chosen to continue to use for its administrative access to the water development. This vehicle route also forms a portion of the southeastern

boundary of the Burnt Timber Canyon WSA, and with its continued use effectively bisects the Inventory Tract into two (2) separate parcels.

The northern portion of Tract 1 has residual human impacts from the historical mining operations on it as well, which are still visible since they are located along the foreground of the Burnt Timber road and from many points within the local area. Although the northeastern boundary of the WSA (a vehicle route) is naturally rehabbing it still serves as a definable boundary. This parcel of 1,113 acres lacks wilderness characteristics, while the remaining 703 acres located south of the WSA, east of the private lands of the Tillett Ranch, and west of Burnt Timber Road does possess wilderness characteristics. (An exception is the small portion isolated by the Road ROW in the southwestern corner which lacks wilderness characteristics.) These 898 acres possess the same wilderness values found on the adjacent WSA lands to its north and are in essentially a natural condition, have outstanding opportunities for solitude and primitive recreation, and have significant supplemental resources present.

With exception of the small portion isolated by the ROW powerline running to Tillett Ranch (12 acres), all of Tract 2 was found to be in essentially a natural condition, have outstanding opportunities for solitude and primitive recreation, and have significant supplemental resources present. The vehicle routes identified in the earlier inventory have much less usage and are naturally rehabbing to the extent that they do not impair wilderness resources and do not cut the Tract into smaller pieces and thus eliminate it from further consideration, as they did previously. The conditions have changed from the previous inventory for this Tract. This area totals 5,375 acres.

### 3.14.3 Meeteetse Unit

The lands have not been previously evaluated; when the prior inventory was conducted the private/public land ownership was more broken up, and several roads were more routinely used. Since then some additional private lands have been acquired and several roads have fallen into disuse and are naturally rehabbing. The result is that a block of public lands was analyzed for their wilderness characteristics.

During initial Wilderness Inventory a preliminary staff review identified these lands as meeting the size requirement (over 5,000 acres) but probably mostly lacking naturalness due to the presence of roads, and lacking opportunity for solitude and primitive recreation on most of the lands due to lack of topography and vegetation screening. However, it was noted that a small portion of the area did have potential for further in-depth evaluation, if some private lands were acquired.

Subsequent to private land acquisition in 2009, this land was acquired and it and the larger BLM lands are the area which is the subject of the following formal review and analysis as a Wilderness Character Inventory Unit. The boundaries are as follows: The western boundary is a combination of private lands and National Forest Service; the southern and northern boundaries are private lands and Montana State lands, and the eastern boundary is private lands. The southern boundary is also the Wyoming/Montana State line.

The Meeteetse Spires Trail and several other vehicle routes which have been determined to be roads bisect portions of the unit into separate parcels. These are identified on the field map, in the road inventory files, and described here:

Tract 1: 23.4 acres in size. Isolated from the rest of unit by Meeteetse Trail, less than 5,000 acres in size and thus lack wilderness character. This parcel will not be considered further.

Tract 2: 977 acres in size. Isolated from the rest of unit by Meeteetse Trail and a vehicle route determined to be a road, less than 5,000 acres in size and thus lack wilderness character. This parcel will not be considered further.

Tract 3: 373 acres in size. Isolated from the rest of unit by Meeteetse Trail and a vehicle route determined to be a road, less than 5,000 acres in size and thus lack wilderness character. This parcel will not be considered further.

Tract 4: 87 acres in size. Isolated from the rest of unit by a vehicle route determined to be a road, less than 5,000 acres in size and thus lacks wilderness character. This parcel will not be considered further.

Tract 5: 3,841 acres in size. Isolated from the rest of unit by a vehicle route determined to be a road, less than 5,000 acres in size and thus lacks wilderness character. Additionally, the parcel has a number of other vehicle determined to be roads or vehicle routes which receive routine use, lacks vegetation and topographical screening. This parcel will not be considered further.

Tract 6: 356 acres in size. Isolated from the rest of unit by a vehicle route determined to be a road, less than 5,000 acres in size and thus lacks wilderness character. This parcel will not be considered further.

Tract 7: A very small parcel of 0.6 acres in size in a corner of the unit isolated by Meeteetse Road from the rest of the public lands. It is less than 5,000 acres in size. This parcel will not be considered further.

Tract 8: Approximately 2.9 acres in size in a corner of the unit and isolated from the rest of the unit by a vehicle roué determined to be a road. It is less than 5,000 acres in size and lack wilderness character. This parcel will not be considered further.

Tract 9: Approximately 10,809 acres in size. This large, central region of the unit has a number of vehicle routes which are somewhat noticeable and used on at least an occasional basis, as well as most of the private land inholdings. Several range developments and their access routes are also visible from a distance due to topography and lack of vegetation screening. This parcel will not be considered further.

Tract 10: The remainder of the unit, approximately 2,149 acres along the west side of the unit, has man-made facilities and structures which are substantially unnoticeable and which do not detract from the surrounding environment. Vehicle routes #2 and #3 are minor, naturally rehabbing, and do not substantially attract casual attention. Vehicle route #1, the route to the cabin, is not open to the public except as a non-motorized trail. It is visible within the view shed of the canyon which it goes up, however.

Of the entire Unit, only the lands in Tract 10 are considered to have wilderness characteristics, and these do not meet the size criteria. However, the boundary does provide the opportunity to manage it as a separate unit, so the staff feels that the exemption criteria apply. The boundary is set as being the Forest Service/BLM on the west, private lands on the south, and the east has a combination of Montana State lands and the Meeteetse Road, vehicle the north boundary is private lands. The lands have minimal intrusions, as noted above, and are substantially in a natural condition. There is abundant vegetation screening and topographical aspects which taken together with minimal vehicle use and general low use numbers offers challenging recreational opportunities for hiking, climbing, and hunting. The lands possess the following significant resources: wildlife, plant, geology, scenery and possibly cultural.

Note: the vehicle route leading to the BLM cabin (vehicle route #1) and the immediate area surrounding the cabin (approximately 3 acres in size) will be cherry-stemmed from the unit as well, for administrative purposes and since they are existing intrusive impacts. This will further enhance the wilderness character of the unit by removing the major human intrusion in the unit

## 3.14.4 Bad Canyon Unit

The unit is bordered by private lands on all sides except the west, which are National Forest lands of the Custer National Forest. These lands are not recommended by the Forest Service for designation as a Wilderness Area. The lands in the unit are less than the minimum size criteria (approximately 2,036 acres), and although the unit is configured in a long and relatively narrow shape which by itself may not usually lend itself to wilderness management, in this case the canyon within the unit can be managed by itself, or the entire unit including the canyon and some other lands along private/public land boundaries.

The lands are located in all or portions of T. 4 S., R. 16 E., sections 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15. All are public lands. There are no private land in-holdings present.

There is no motorized access to this parcel. The BLM does have a non-motorized ROW across private lands and there is an undeveloped and primitive non-motorized trailhead located on the south side of the unit.

The area has been extensively timbered with scenic geological formations.

The riparian corridor is in a natural condition, with few invasive species present. A portion of the river segment has had a natural barrier slightly modified for protection of natural resources (fish Species) but this is substantially un-noticeable (see attached photos).

Bad Creek contains a stable population of Yellowstone Cut-throat trout, which is a native species, listed as endangered, and is a supplemental feature for the unit. The lands are important habitat for Grizzly Bear. The riparian corridor serves as an important wildlife migration corridor.

The trout, and the natural scenery, attract an unknown number of casual recreationists, mostly from the local communities, but the location is advertised as a destination in several publications regionally. There are no known commercial recreation operators. All recreational use is primitive in nature. The surrounding private lands have strictly restricted access as well.

A portion of the unit was previously burned in a wild fire, but is naturally rehabbing. Evidence of fire suppression activities is minimal.

There is abandoned motorized vehicle route which enters the unit from the west across Forest lands. It is naturally rehabbing and is not open for use and has not been for some time. There is one vehicle route which accesses the lands from the south. It is maintained only by the passage of vehicles and is not open to general use across private lands. This route has received only occasional use related to grazing in the past.

There is plentiful vegetation and topographical screening for an outstanding level of solitude. The area has significant geological, riparian, wildlife, and scenery resources which provide an outstanding level of primitive recreation attractions and experiences. The opportunity for this kind of recreation is further enhanced by the administrative lack of motorized access across the private lands.

### 3.14.5 Weatherman Draw Unit

The lands are bordered by a combination of roads including Cottonwood Creek Road, a railroad line, private lands, and Montana State lands. This inventory boundary was slightly different than the initial inventory effort due to land acquisition and some change in use patterns recognized by staff as altering the area. This also resulted in two private land parcels being established as inholdings. These two inholdings are not included in this analysis.

Weatherman Draw contains significant historic, cultural, and scenic values. There is currently a Weatherman Draw Archaeological District in place within the ACEC, but this archaeological district is only for the rock art. This district consists of 80 separate rock art sites. The ACEC currently covers approximately 4,365 acres. In addition to the rock art and prehistoric habitation sites, the Weatherman Draw ACEC and surrounding area contain historic coal mines (found both in and outside of the ACEC), historic homesteads, evidence of native American (Crow) horse traps/corrals, vision quest and sacred sites (which are still in use) and historic graffiti.

The unit meets the size criteria (11,603 acres), but the current conditions on the ground do not support the earlier decision that the unit lacks naturalness. The lands have been closed to motorized vehicle use. The visual impacts do not attract the notice of a casual observer. The vehicle routes are not being used except for non-motorized primitive recreation and are naturally rehabbing. The area does offer a high level of solitude and primitive recreation. There are supplemental resources present. The unit does meet the conditions for further consideration for Wilderness Character.

## 3.15 Cave and Karsts Resources

The BLM has not conducted a formal inventory of cave resources; however, inventories by other individuals and entities identified numerous caves, principally in the Pryor Mountains. These inventories provide general locations, physical descriptions, and low detail maps (Campbell 1978 and Elliot 1963). The BLM does not promote, publish, or release information on cave locations to the general public.

Caves administered by the BiFO include Mystery Cave, Sykes Cave, Four-Eared Bat Cave, Frogg's Fault Cave, Royce Cave, Salt Lick Cave, Snow Drift Cave, and Four by Four Cave. While Mystery Cave is generally recognized as meeting the definition of a significant cave (below), the other caves have not been inventoried to evaluate significance. Currently there are no cave management plans for significant caves in the decision area.

The Federal Cave Resources Protection Act of 1988 provided for protection of cave resources on federally managed lands. Provisions in the act charge the DOI to issue regulations that define what constitutes significant caves and identify and list significant caves on federally managed lands. The legislation also defines prohibited acts and criminal penalties for violation of the law.

Caves may be found in a variety of geological formations including sedimentary rocks and volcanic lavas. Karst landforms, including sinkholes, sinking streams, resurgences, and other features develop in association with limestone and dolomite. Carbonate rock outcrops like these are prominent in the planning area, primarily in the Pryor Mountains of Carbon County and the Snowy Mountains in Golden Valley County. Karst features are likely in the narrow band of upturned Madison Group limestone beds that flank the east and north face of the Beartooth Mountains. There is potential for caves in this narrow band, however, if cave development occurred prior to the uplift of the Beartooth Plateau the subsequent tectonic activity probably collapsed any caves. There is a potential for redevelopment of caves in the limestone "palisades area" in the vicinity of the community of Red Lodge, Montana. Numerous caves have been described in the Pryor Mountains of Carbon County. See Map 46 for Cave and Karst locations.

The Pryor Mountains have several distinct fault bounded blocks dipping to the south or southwest with elevations ranging from 4,000 to above 8,000 feet. The Lodgepole, Mission Canyon, and Upper Madison formation carbonates outcrop in the middle and upper elevations. Elliot (1963) describes all caves forming in the Upper Madison limestone. Campbell (1978) describes, "*Nearly every cave … is in the upper 100 feet of the Mission Canyon Formation*." More than 40 Caves have been found in the Pryor-Bighorn area, with at least eight of these located on public lands. Some caves may have been developed in the Upper Madison limestones beneath a cap of Pennsylvanian Tensleep sandstone. These caves may only be revealed as a consequence of mining in the area.

Mystery Cave is located in the PMWHR in Carbon County, Montana. The 1984 RMP stated, "The BLM's cave management policies do not allow indiscriminate entrance into Mystery Cave without a BLM guide" (BLM 1984). During the 1990s, access restrictions for Mystery Cave were relaxed, and currently access is permitted to limited groups who provide personal identification information and a responsible group leader. Between November and May bats

hibernate in the cave and, consequently, access is restricted during this time of year. No other caves in the BiFO decision area currently receive active management.

The 1984 RMP EIS provided minimal guidance for cave management or the protection of karst resources. Guidance was restricted to the policy of limiting access to Mystery Cave without a BLM guide and limiting access to a season from June through October, ostensibly because this was the period when weather and road conditions allowed guides to access to the cave. No mention was made of protection of bat hibernacula or any other reason for limiting access by season.

The Federal Cave Protection Act of 1988 (FRCPA, PL 100-691) directed that Federal lands be managed in a manner which protects and maintains, to the extent practical, significant caves.

The objectives of the BLM Cave and Karst Resources Management program found in Manual Section 8300 are to:

- Carry out the direction provided by the Federal Cave Resources Protection Act of 1988 (FCRPA, PL 100-691) and the FCRPA Implementation Regulations at 43 CFR, Part 37, Cave Management.
- Manage cave and karst systems to protect and maintain their biologic, geologic, mineralogic, paleontologic, hydrologic, cultural, educational, scientific, recreational values and other cave values from damage; and ensure that they are maintained for the use of the public, both now and in the future.
- Establish surface and subsurface management practices and policies that are adequate to ensure long-term protection for cave and karst systems. Address cave and karst resources and issues in all appropriate management plans including recreation, wildlife, watershed, or other multi-resource activity plans and, as applicable, in NEPA documents.
- Ensure the listing of caves meeting the significance criteria and the confidentiality of cave locations.
- Promote consistency among Federal agencies with cave management responsibilities, where appropriate; and facilitate the efficient and effective exchange of information between Federal, State, and local agencies, private organizations, research institutions, and individuals concerned with the management, protection, or scientific investigation of cave resources.

It is current BLM policy, as articulated by the "stay out, stay alive" campaign, to discourage the public from entering underground features (caves, karsts, and abandoned mines) on public lands, as they risk injury or death, as well as potentially increase the risk of transferring White Nose Syndrome among vulnerable bat populations. Despite the high risk, a number of the local caves are known, some are advertised as specialty destinations for cavers, and some do receive use by cavers and casual users.

## 3.16 Resource Uses

This section provides information on the current condition of resource uses that could be affected by the revised RMP alternatives described in Chapter 2. Resource uses discussed in this RMP include:

- Energy and mineral resources
  - Coal
  - Fluid minerals (oil, gas, geothermal)
  - Locatable minerals (gold, silver, copper, etc.)
  - Mineral materials (sand and gravel)
- Forestry and woodland products
- Lands and realty
  - Land tenure, adjustment, and access
  - Rights-of-way, leases, and permits
  - Withdrawals
- Livestock grazing
- Recreation and visitor services
- Trails and travel management
- Renewable energy
- Transportation and facilities

## 3.17 Energy and Mineral Resources

Mineral resources managed by the federal government are categorized by statute, and the mineral categories below are used to manage mineral resources on federally administered lands.

Leasable minerals are those leased to individuals for exploration and development. They are acquired by applying to the federal government for a lease to explore and develop the minerals. Leasable minerals are subdivided into two classes, fluid and solid. Fluid minerals include geothermal resources and associated by-products, oil and gas, oil shale, native asphalt, oil impregnated sands, and any other material where oil is recoverable by special treatment after the deposit is mined or quarried. Solid leasable minerals are specific minerals such as coal and phosphates. These minerals are acquired through the following: the Mineral Leasing Act of 1920, as amended and supplemented, Mineral Leasing Act for Acquired Lands of 1947, as amended, and the Geothermal Steam Act of 1970, as amended (AGI 1997).

Saleable Minerals or Mineral Materials are common variety minerals that may be obtained through a free use permit by federal, state, and local governments and qualified nonprofit groups. Sales for common variety minerals must be obtained by commercial and private entities. Examples include sand, gravel, pumice, petrified wood, and common dimension stone.

Saleable minerals are regulated by the Federal Materials Act of 1947 and the Multiple Surface Act of 1955.

Locatable Minerals are all minerals subject to exploration, development, and production under provisions of the Mining Law of 1872. Locatable minerals include both metallic and non-metallic minerals such as gold, silver, specialty clays, and zeolites.

## 3.17.1 Solid Leasable Minerals

BLM considers proposals for developing federal leasable minerals (coal, phosphate, sodium, potash, sulfur, oil shale, native asphalt, and solid and semisolid bituminous rock) on a case by case basis. Site specific environmental analysis is required to lease these minerals. While occurrences of solid leasable minerals are present in the decision area, no significant production of these minerals, with the exception of coal, is currently underway or anticipated.

### 3.17.1.1 Coal

Coal may be found at several stratigraphic horizons within the planning area, including the Cretaceous Eagle, Judith River, Hell Creek, and the Paleocene Fort Union formations (Map 47 - Coal Locations).

Coal mining has had a long history in the planning area. Mining has occurred since the late 1800s in the Bridger, Joliet/Fromberg, Red Lodge-Bearcreek coalfields located in Carbon County and in the Bull Mountains coalfield, located in Mussellshell County. The only operating mine in the planning area is Signal Peak Energy's Bull Mountains Mine No. 1, located in Mussellshell County. The Mammoth-Rehder coal bed is being mined at this facility by both continuous and longwall underground methods. Please refer to Appendix M, Coal, for a more detailed coal development history of the planning area.

There are no active federal coal leases in the planning area. The planning area will be open for coal exploration licenses. Coal licenses to mine for domestic use will be available and use per family may not exceed 20 tons annually. Coal leasing by application will remain available for underground and surface mining consideration through the plan amendment process. Prior to approving exploration licenses and licenses to mine, and coal leases, a project-specific environmental review document will be prepared to assess impacts and develop mitigation measures. Prior to issuing coal leases, unsuitability criteria will be applied, and a plan amendment prepared (please refer to Appendix M, Coal, for a list of the coal unsuitability criteria).

In 2008, Signal Peak Energy submitted an application to lease federally-owned coal reserves on five lease tracts located in Mussellshell County. The lease tracts, totaling 2,679.76 acres, contain an estimated 61.4 million tons of in-place coal reserves in the Mammoth-Rehder coal bed. In 2011, the decision to lease the tracts competitively was made by the BLM.

Previous leasing decisions for federal coal will be brought forward in this RMP. All of the federal coal which is minable by underground methods is suitable for further consideration for leasing or exchange, pending further study. The BiFO will not apply coal unsuitability criteria

to these lands until a site-specific mine plan is filed, detailing the proposed location of surface facilities. Known coal resource areas with underground development potential are located in the Bull Mountains and in Carbon County. No additional coal screening determinations or coal planning decisions are planned for this RMP, unless public submission of coal resource information or surface resource issues indicate a need to update these determinations.

Areas of federal coal that could be mined by surface methods must be screened for potential coal development, unacceptable environmental conflicts, and significant surface owner opposition to mining, according to the four coal screens (43 CFR 3420.1-4). The application of the screens includes consideration of all resources in the unsuitability criteria (43 CFR 3461) as well as other resources not specifically addressed by the criteria.

The principle coal resource decision in the land use plan (LUP) is the identification of coal areas that could be determined as being acceptable for further consideration for coal leasing. 43 CFR 3420.1 4(e) states:

"The major land use planning decision concerning the coal resource shall be the identification of areas acceptable for further consideration for leasing which shall be identified by the screening procedures listed below."

There are four coal screens which must be applied:

- **Identification of Coal with Development Potential –** Areas could be eliminated from further consideration if they do not contain coal with development potential
- **Surface Owner Consultation –** Negative surface owner views could cause lands to be eliminated from further consideration
- **Application of Unsuitability Criteria –** Areas can be eliminated if determined to unsuitable for surface mining based upon application of a list of 20 unsuitability criteria
- **Multiple Use Conflict Analysis –** Additional areas of coal resource may be eliminated from consideration based on multiple use considerations if other federal resource values are determined to be superior to the coal resource

The four coal screens identified must be applied to coal deposits in the decision area. Once the coal screens have been applied via the land use process, then the unsuitability criteria are generally reviewed and possibly readjusted during the environmental review process for subsequent coal lease applications.

## 3.17.2 Fluid Minerals

### 3.17.2.1 Geothermal Energy

Geothermal energy is derived from heat in the earth's crust that is released as hot water and steam. Due to a variety of geologic processes, geothermal resources underlie substantial portions of many western states, including lands in the BiFO planning area. However, there is presently only a very low level of interest in developing Montana's federally owned geothermal resources. The US Geological Survey (Williams 2008) gave eastern Montana a low favorability rating for the occurrence of geothermal resources in the planning area.

Geothermal resources in the planning area are classified as low temperature (less than 194$^{o}$F); there are at least six known thermal springs or warm drill holes in and immediately adjacent to the planning area with measured temperatures ranging from 103$^{o}$F to 165$^{o}$F (Montana DEQ 2007). There are no geothermal power plants in Montana because there are no identified high temperature resources in the state. The BLM has received only two inquiries about development of federal geothermal resources in Montana (both in western Montana) since 1979. There are no inventoried direct use facilities using geothermal heat in the planning area (Geo-Heat Center 2008).

### 3.17.2.2 Oil and Gas

Oil and gas fields are scattered throughout the BiFO planning area with fields primarily concentrated in northern Musselshell County and southern Carbon County (Big Snowy uplift and Elk Basin areas). The only county in the planning area with no production is Wheatland County. Map 48 – identifies active oil and gas fields and development in the planning area.

The first drilling in Montana occurred near the 'Cruse' oil seeps, in Carbon County, in about 1890. Drilling occurred along strike (northwest-southeast) to the Beartooth Mountain front. Only small volumes of low gravity oil were reportedly produced.

The Elk Basin area in Carbon County experienced early development as an extension of the Wyoming portion of the field. The first drilling occurred about 1915; this activity pre-dated the Mineral Leasing Act of 1920. At that time, oil was developed as a placer mineral on mining claims located under the General Mining Act of 1872, as amended by the Petroleum Placers Act of 1897. Many of these petroleum placers went to patent (became private land).

Further drilling occurred as operators attempted to expand the known producing area along the axis of the Elk Basin anticline. Field limits were extended to the northwest, with the later discoveries at Elk Basin Northwest, Clarks Fork, the Clarks Fork North and Clarks Fork South fields. In the same time frame (1910s-1920s), exploration occurred at the Dry Creek Dome in central Carbon County. Natural gas was discovered there in 1919 and extended into Golden Dome in 1962.

In Big Horn County, the Soap Creek Oil Field was discovered in 1920 and then expanded by new drilling as recent as 2005. The Hardin Gas Field was discovered in 1928 and expanded as a result of new drilling into the 1930s, with the most recent well drilled in 1975.

Early prospecting for oil was concentrated around geologic structures that were exposed at the surface. These structures, often called "Sheepherder Anticlines", were believed to be indicators of potential oil reservoirs in subsurface structures. Most of the early exploration and development occurred in proximity to these exposed anticlines and domes. Many O&G fields are still identified by these surface structures (i.e., Golden Dome, Gage Dome, and Dean Dome). Often, the earliest wells drilled in these structures were not drilled deep enough and did not achieve a discovery.

Many other anticlines were 'breached' by erosion that exposed the reservoir rock leaving only stained or bleached rock as indications of the past presence of oil. This is the case on the east flank of Red Dome in Carbon County. Here, the Triassic Chugwater Formation red beds have zones of sandstones that are gray; the oil, while it was in the rock, prevented the oxidation of the iron in the rock matrix and cement.

The first drilling in Musselshell County was not successful; however by 1920, oil was discovered in the Heath Lime at Devil's Basin field. By the end of 1921, oil had been discovered in the Soap Creek field in Big Horn County and the Lake Basin field in Stillwater County. Mosser Dome field in southwestern Yellowstone County opened in 1936.

In the 1940s, additional oil fields were discovered in Musselshell County, including Gage Dome, Ragged Point, Big Wall, and Melstone. All were surface structures ('Sheepherder Anticlines') with the oil found in Mississippian carbonate rocks (Amsden, Kibbey, Heath, and Tyler Formations). New fields were discovered in surface structures (Ivanhoe, Stensvad, Delphia, Hawk Creek, Hiawatha, Keg Coulee, Pole Creek, Mason Lake), and existing fields were expanded into the 1960s. Similarly, exploration of the surface structure at Wolf Springs resulted in an oil discovery in Yellowstone County in 1955 and at Weed Creek in 1967.

The first gas production in Sweet Grass County occurred when the Six Shooter Dome field was discovered in 1947. First production in Golden Valley County occurred with the discovery of gas in the Big Coulee field in 1948. Later that year oil was discovered in Golden Valley's Woman's Pocket and Devil's Pocket fields.

In 1953 the Ash Creek field in southern Big Horn County was discovered, with oil produced from the Upper Cretaceous Shannon-Formation. The Mackay Dome and Roscoe Dome fields, in southern Stillwater and Carbon Counties, respectively, were discovered in the late 1950s. Both produce from Lower Cretaceous sandstones.

In the 1970s, the Rapelje gas field in Stillwater County was discovered. Two oil price shocks in the 1970s resulted in a quadrupling of the price of oil over a four year period from around $3.00 per barrel in mid-1973 to over $12.00 per barrel in 1977. The Islamic Revolution in Iran in 1979 sent oil prices still higher, with the price peaking at over $38.00 per barrel in 1981.

The rapid increase in the price of oil resulted in a rush of new prospect generation. Even prospects that had a low probability of finding product were drilled. Conservation and new discoveries led to in an increased supply while demand was falling, resulting in a price collapse, with oil in Montana falling below $10.00 per barrel in early 1986. For the rest of the 1980s, the BLM allowed operators to leave their wells 'shut in' (in a non-producing status). This policy allowed operators to maintain their wells without having to operate them at an economic loss.

In 1992 the BLM terminated the shut in policy and issued new regulations that provided for a reduced royalty rate for oil properties that averaged less than 15 barrels of oil per well per day (so-called 'stripper wells/properties'). The royalty rate reduction (RRR) was intended to reduce operators' operating costs and encourage the greatest ultimate recovery of oil. The BLM anticipated that operators would take advantage of this incentive and work over existing wells to restore or increase production at these properties. The RRR would be recalculated every year, and could fall further if the average production rate continued to decrease. The regulation was in effect for about 14 years and terminated effective February 1, 2006 (when the oil price exceeded the threshold established in the regulation).

In 2008, there were 48 active O&G fields in the planning area, as listed in Table 3-45. The earliest discovery date for a field presently producing is Elk Basin in 1915. The last new field discovery was in 1991, when the Gray Blanket (Big Horn County) and Sixshooter Dome Fields (Stillwater and Sweet Grass counties) were established.

**Table 3-45 Active Oil and Gas Fields in the Planning Area**

| Field | County | Discovered | Oil | Gas |
|---|---|---|---|---|
| Gray Blanket | Big Horn | 1991 | X | |
| Lodge Grass | Big Horn | 1964 | X | |
| Soap Creek | Big Horn | 1921 | X | |
| Soap Creek, East | Big Horn | 1977 | X | |
| Toluca | Big Horn | 1983 | | X |
| Waddle Creek | Big Horn | 1983 | | X |
| Clarks Fork | Carbon | 1954 | X | X |
| Dry Creek | Carbon | 1929 | X | X |
| Dry Creek (Shallow Gas) | Carbon | 1975 | | X |
| Dry Creek, Middle | Carbon | 1958 | X | X |
| Dry Creek, West | Carbon | 1976 | X | X |
| Elk Basin | Carbon | 1915 | X | |
| Elk Basin, Northwest | Carbon | 1964 | X | |
| Golden Dome | Carbon | 1953 | X | X |
| Big Coulee | Golden Valley | 1954 | | X |
| Big Gully | Musselshell | 1976 | X | |

**Table 3-45 Active Oil and Gas Fields in the Planning Area**

| Field | County | Discovered | Oil | Gas |
|---|---|---|---|---|
| Big Wall | Musselshell | 1948 | X | |
| Delphia | Musselshell | 1967 | X | |
| Devil's Basin | Musselshell | 1920 | X | |
| Gage | Musselshell | 1944 | X | |
| Hiawatha | Musselshell | 1967 | X | |
| Howard Coulee | Musselshell | 1974 | X | |
| Ivanhoe | Musselshell | 1956 | X | |
| Jim Coulee | Musselshell | 1971 | X | |
| Keg Coulee | Musselshell | 1960 | X | |
| Keg Coulee, North | Musselshell | 1960 | X | |
| Kelley | Musselshell | 1966 | X | |
| Little Wall Creek | Musselshell | 1981 | X | |
| Little Wall Creek, South | Musselshell | 1975 | X | |
| Mason Lake | Musselshell | 1964 | X | |
| Melstone | Musselshell | 1948 | X | |
| Melstone, North | Musselshell | 1976 | X | |
| Ragged Point | Musselshell | 1956 | X | |
| Ragged Point, Southwest | Musselshell | 1973 | X | |
| Stensvad | Musselshell | 1958 | X | |
| Tinder Box | Musselshell | 1988 | X | |
| Willow Creek, North | Musselshell | 1970 | X | |
| Winnett Junction | Musselshell | 1973 | X | |
| Big Coulee | Stillwater | 1954 | | X |
| Dean Dome | Stillwater | 1966 | X | |
| Fiddler Creek | Stillwater | 1952 | X | |
| Lake Basin | Stillwater | 1924 | X | X |
| Sixshooter Dome | Stillwater | 1991 | | X |
| Sixshooter Dome | Sweet Grass | 1991 | | X |
| Crooked Creek | Yellowstone | 1985 | X | |
| Weed Creek | Yellowstone | 1966 | X | |
| Wolf Springs | Yellowstone | 1955 | X | |
| Wolf Springs, South | Yellowstone | 1984 | X | |

**Note**
Sources: Montana Board of Oil and Gas (2007), Tonneson (1985).

On October 14, 2008, the Automated Fluid Mineral Support System (AFMSS) databases for the Miles City and Worland field offices were queried for the number of federal wells in the BiFO planning area boundaries. (Worland was queried because it has administrative control over certain wells in Carbon County). The AFMSS databases show the totals as referenced in Table 3-46.

**Table 3-46 Federal Wells in the BiFO Planning Area**

| Type of Well | Number of Wells |
|---|---|
| Drilling wells | 1 |
| Producing gas wells | 9 |
| Producing oil wells | 59 |
| Water injection wells | 5 |
| Shut in oil wells | 1 |
| Temporarily abandoned wells | 7 |

In 2007, federal O&G production in the planning area totaled 277,532 barrels of oil and 147,325 million cubic feet of gas. Table 3-47 provides a county by county breakdown of production.

**Table 3-47 Federal Oil and Gas Production in the BiFO Planning Area**

| County/Area | 2007 Total Oil Production (Barrels)* | 2007 Oil Production: Federal Minerals (Barrels)** | Percent of Total Oil Production from Federal Minerals | 2007 Gas Production (mcf) [a] | 2007 Natural Gas Production: Federal Minerals (mcf) [b] | Federal Percent of Total Gas Production | Federal Gas Plant Products (NGLs) | Fiscal Year 2008 Disbursements [b] | BLM Leased Acres |
|---|---|---|---|---|---|---|---|---|---|
| Montana | 34,857,704 | 3,838,294 | 11 | 120,768,222 | 32,161,818 | 0.27 | | | |
| BiFO Planning Area | 686,221 | 277,523 | 40 | 15,768,779 | 147,325 | | | 1,743,058 | 158,544 |
| Big Horn | 61,559 | | 0 | 13,062,106 | 3,934,325 | | | 0 | 3,934 |
| Carbon | 457,110 | 271,696 | 59 | 1,952,657 | 147,325 | 0.08 | 1,466,773 | 1,566,019 | 48,941 |
| Golden Valley | 0 | | 0 | 94,673 | | 0 | | 24,222 | 17,903 |
| Musselshell | 144,731 | 4,995 | 3 | 6,601 | | 0 | | 122,513 | 54,842 |
| Stillwater | 0 | | 0 | 583,553 | | 0 | | 24,133 | 21,612 |
| Sweet Grass | 0 | | 0 | 69,189 | | 0 | | 0 | 4,309 |
| Wheatland | 0 | | 0 | 0 | | 0 | | 707 | 1,023 |
| Yellowstone | 22,821 | 832 | 4 | 0 | | 0 | | 5,464 | 8,183 |

**Note:**

[a] Source: Montana Board of Oil and Gas (2007)

[b] Source: Mineral Management Service (2008)

## 3.17.3 United States Geological Survey Oil and Gas Assessments

The United States Geological Survey (USGS) completed nationwide assessments of O&G resources in 1995. Since then, it has issued a new assessment for a number of provinces including the Powder River Basin, Big Horn Basin, and North Central Montana Province.

### 3.17.3.1 1995 USGS Assessment

The planning area is located in the Rocky Mountains and Northern Great Plains Region, as defined by the USGS in its 1995 National Assessment of United States Oil and Gas Resources (USGS 1995). Portions of southwest Montana, north central Montana, Bighorn Basin, and Powder River Basin provinces are in the planning area (Map 167- USGS Oil and Gas Provinces 1995 Boundaries).

The Southwest Montana Province lies north and northwest of Yellowstone National Park and east and southeast of the Cordilleran Thrust Belt in the southwestern part of the Rocky Mountain Foreland in southwestern Montana. This province includes all of Sweet Grass and Stillwater counties and western Carbon County. All or portions of four conventional plays in this province are located in the planning area. The 1995 assessment defined a play as a set of known or postulated oil and (or) gas accumulations sharing similar geologic, geographic, and temporal properties such as source rock, migration pathway, trapping mechanism, and hydrocarbon type. Conventional accumulations are discrete deposits, usually bounded by a downdip water contact, from which natural gas or oil can be extracted using conventional techniques (USGS Circular 1118 1995).

A small portion of the North-Central Montana Province lies in the planning area. It includes all of Golden Valley, Musselshell, Wheatland, and Yellowstone counties and a small part of Big Horn County. The area of the province in the planning area is bounded by the Crazy Mountains Basin to the southwest and the Powder River Basin to the southeast. The province has been actively explored for oil since it was discovered in adjoining Alberta, Canada, in 1903. Portions of 10 conventional and unconventional plays are found in that portion of the Province in the planning area. Unconventional accumulations are a broad class of oil or gas deposits of a type (such as gas in "tight" sandstones, gas shales, and coal bed natural gas) that historically have not been produced using traditional development practices. Such accumulations include most continuous accumulations which are hydrocarbon accumulations pervasive throughout large areas that are not significantly affected by hydrodynamic influences (USGS Circular 1118 1995).

Portions of the Big Horn Basin Province extend north from Wyoming into Carbon County, Montana. The first fields in this Province were discovered in 1906 and 1907. As noted above, the first oil well drilled in the state was in the Elk Basin field in 1915 in Carbon County. Portions of 10 conventional plays associated with this province occur inside planning area boundaries.

A portion of the Powder River Basin Province lies in Big Horn County, Montana, in the planning area. The Powder River Basin is a major inter-montane basin of Laramide origin in the northern Rocky Mountains that occupies northeastern Wyoming and a small portion of southeastern Montana. The basin makes up the majority of the surrounding Province. The Powder River Basin is a deep, northerly trending, asymmetric, mildly deformed trough, approximately 250 miles long and 100 miles wide. Its structural axis is close to the western side. The thickness of the sedimentary section exceeds 18,000 feet along the basin axis. The basin is one of the richest petroleum provinces in the Rocky Mountains. The first discovery in the basin was in Wyoming in 1887. Portions of five conventional and one hypothetical conventional plays are found in that portion of the Province inside planning area boundaries. Portions of one unconventional (coal bed natural gas) play are found in the planning area.

### 3.17.3.2 Subsequent USGS Assessments

Since completing the 1995 Assessment, the USGS has reassessed the Powder River Basin, the North-Central Montana, and the Big Horn Basin provinces that partially overlap the planning area.

The existing assessment for the Powder River Basin Province was revisited in both 2002 and 2006. In neither case did the boundaries of the Province change. The 2002 assessment addressed the potential for undiscovered resources in continuous O&G accumulations in the Powder River Basin. The assessment was based on geologic elements such as hydrocarbon source rocks, reservoir rocks, and hydrocarbon traps in four Total Petroleum Systems (TPS) identified in the basin by the USGS. In the original version of the assessment published in 2002, the USGS identified portions of two assessment units (AUs) in the Tertiary-Upper Cretaceous Coal-Bed Methane TPS in the planning area. It also identified one AU, the Shallow Continuous Biogenic Gas AU in the Cretaceous Biogenic Gas TPS in the planning area (USGS Fact Sheet 146-02, 2002). The USGS reassessed the conventional resources of O&G in the Powder River Basin in 2006 (USGS Fact Sheet 2006-3135, 2006). A TPS consists of all genetically related petroleum generated by a pod or closely related pods of mature source rock. Particular emphasis is placed on similarities of the fluids of the petroleum accumulations. Plays as described in the 1995 Assessment are established primarily according to similarities of the rocks in which petroleum accumulations occur. The AUs are more closely associated with the generation and migration of petroleum than plays (USGS, DDS-69-D, 2005).

In May 2008, the USGS finished a reassessment of the undiscovered biogenic gas resources in the North-Central Montana Province. For this assessment, it increased the area of the Province to include most of the eastern two-thirds of Montana including portions of the planning area. Work on this assessment began in 2000 as part of the national O&G assessment project. The assessment was based on the general geologic elements used to define a TPS. Using that geologic framework, the USGS defined the Cretaceous Judith River through Belle Fourche Biogenic Gas TPS with seven associated AUs (USGS Fact Sheet 2008-3036, 2008).

In June 2008, the USGS released a new assessment of undiscovered O&G resources of the Bighorn Basin Province in Wyoming and Montana, covering about 6.7 million acres. Portions of two TPSs are in that portion of the Province in Montana. The first of these TPSs is the

conventional Phosphoria TPS made up of one AU. The other is the Cretaceous-Tertiary Composite TPS. Parts of two AUs that contain coal bed natural gas occur in the Montana portion of the Bighorn Basin Province (USGS Fact Sheet 2008-3050, 2008).

## 3.17.4 Federal Drilling Activity

Federal drilling activity for the last 18 years is shown in Table 3-48. Total activity is consistently low in any one year. Total drilling activity on all ownerships in the planning area is shown in Table 3-49. Activity has remained stable on all ownerships since 1989.

**Table 3-48 Summary of Federal Wells Drilled in the Last 18 Years**

| Year | Drilled Producing Well | Drilled Dry Hole |
|---|---|---|
| 2007 | 1 | 0 |
| 2006 | 0 | 0 |
| 2005 | 0 | 0 |
| 2004 | 0 | 1 |
| 2003 | 0 | 1 |
| 2002 | 0 | 0 |
| 2001 | 5 | 5 |
| 2000 | 3 | 2 |
| 1999 | 1 | 1 |
| 1998 | 0 | 0 |
| 1997 | 0 | 0 |
| 1996 | 0 | 2 |
| 1995 | 0 | 2 |
| 1994 | 0 | 1 |
| 1993 | 0 | 2 |
| 1992 | 0 | 0 |
| 1991 | 2 | 1 |
| 1990 | 2 | 6 |
| **TOTALS** | **14** | **24** |

**Note:**
Source: AFMSS 2009

**Table 3-49 All Well Types, All Ownerships in the Planning Area**

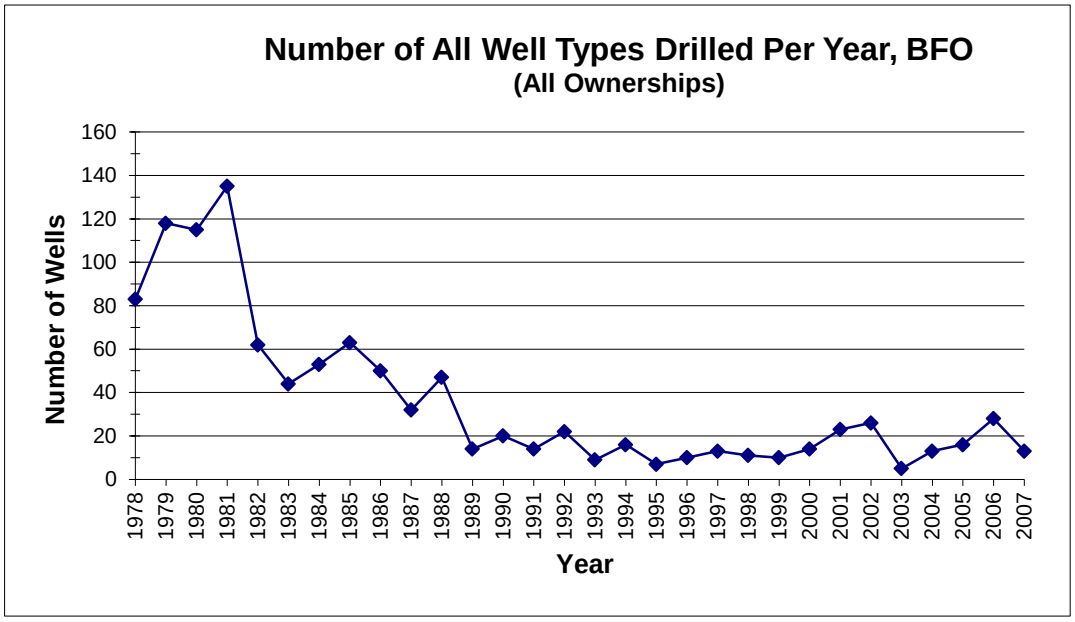



Table 3-48 and Table 3-49 were copied from the reasonably foreseeable development (RFD) scenario for the Billings RMP depict the drilling history for BiFO.

### 3.17.4.1 Existing Federal Leases

There are a total of 235 active leases in the planning area covering 145,988.55 acres. This is approximately 16 percent of the federal O&G estate in the planning area.

### 3.17.4.2 Well Spacing

Before development drilling begins, a well spacing pattern must be established. The State of Montana establishes well spacing patterns for both exploratory and development wells (field spacing) which the BLM generally adopts after (the BLM participates in all hearing of the Montana Board of Oil and Gas Conservation). Spacing unit size is established to provide for the most efficient and economic recovery of O&G from a reservoir. Normal well spacing statewide ranges from 40 to 640 acres, depending on discovery well characteristics such as porosity, permeability, pressure, composition, depth of formations, etc.

### 3.17.4.3 Unitization and Communitization

Unit and communitization agreements can be formed in the interest of conservation and to allow for the orderly development of O&G reserves. An exploratory unit is used for the discovery and development of the field in an organized and efficient manner. A unit agreement provides for the recovery of O&G from the land as a single consolidated entity without regard to separate lease ownerships. A unitization agreement provides for the allocation of production

among all interest owners. No exploratory units are located in the planning area. Five secondary units are located in the planning area boundary.

A communitization agreement combines two or more leases (federal, state, or fee) that otherwise could not be independently developed in conformity with established well spacing patterns. The leases in a spacing unit share in the costs and benefits of the well drilled in the spacing unit. Fifteen communitization agreements covering 3,654 acres are located in the planning area.

### 3.17.4.4 Projected Reasonably Foreseeable Development for Oil and Gas

The following information is summarized from the Reasonable Foreseeable Development (RFD) Scenario for oil and Gas for the Billings Field Office (Montana/Dakotas Bureau of Land Management, 2010). Map 49 identifies the areas with Low or Moderate levels of forecasted drilling activity. There are no identified areas of High forecasted drilling activity (greater than 5 wells drilled per year). Areas of Low Drilling activity are forecasted to have *no more than one* well drilled per township per year. Areas of Moderate Drilling activity are forecasted to have between *one and five* wells drilled per township per year. The 'Moderate' potential areas were delineated from the extent of existing O&G fields and the resource plays that may encourage further drilling activity. The 'Low' potential areas are lands that have been sparsely explored, have no established production, and are not in identified geological structures (especially surface-exposed structures that have drawn past drilling activity). Map 167 shows the RFD for the Billings Field Office overlaid with the federal mineral estate.

It is likely that forecast drilling activity levels will be somewhat higher than the levels of the past 20 years. For the 20 year forecast period of the RMP, the BLM anticipates an *average of 20 wells to be drilled per year* (versus 17 wells drilled per year from 1989-2008). Some of the new drilling will be in wildcat areas in the Crazy Mountains Basin play. There are fewer Federal minerals in Sweet Grass and Wheatland Counties than in the other counties in the BiFO. Federal conventional and unconventional, including coalbed natural gas (CBNG) wells will average *three to four* wells per year.

CBNG development in the BiFO is forecast to occur in either the Bull Mountain Basin or in the Bighorn Basin. The BLM does not anticipate that CBNG exploration and development in the BiFO would have the same intensity as does the CBNG development in the Powder River Basin. Compared to the Powder River Basin, coals in the above-described fields are:

- Thinner
- Higher rank, with likely higher adsorbed gas levels
- More deeply buried
- Drilling and development likely would have a lower well density
- There would likely be a single well per spacing unit (no thick, stacked coals)

- The coals are generally too deep below the surface to supply groundwater for most domestic and agricultural purposes
- Groundwater in the coals likely has higher salinities and would not be suitable for domestic or agricultural purposes

In contrast to the Powder River Basin CBNG development, the BLM expects that produced water volumes associated with CBNG development in the BiFO would be similar to conventional O&G development, having lower volumes and higher salinities. It is probable that the produced water would be reinjected into a subsurface aquifer that already has high salinities, or would be allowed to evaporate in lined pits.

The BLM does not anticipate that CBNG drilling and development would result in any different environmental impacts than conventional drilling and development. In contract to the Powder River Basin (PRB), coals in the Big Horn and Bull Mountains Basins are at greater depths. Operators would drill using conventional drilling rigs and conventional drilling techniques, so the area disturbed would be similar to conventional wells. The coal beds generally are not sources of fresh water for domestic or agricultural purposes (underground sources of drinking water). Produced water would be disposed of in a similar manner as water from conventional reservoirs – most likely reinjection into horizons bearing water of similar or lower quality. The coals are higher grade and would have greater volumes of adsorbed CBNG than PRB coals. Because there aren't thick, stacked coal beds, there would likely be only one well drilled per well pad. For these reasons, the BLM believes it is not necessary to assess CBNG drilling separately from other drilling activity.

### 3.17.4.5 Locatable Minerals

Federal minerals in the decision area are available for exploration and development unless previously withdrawn. Table 3-50 shows the number of active claims by county in the planning area. The surface management program for locatable mineral exploration and development is administered under federal regulations (CFR 3809) and an MOU between the Department of Natural Resources and Conservation (DNRC) and BLM. Locatable mineral activities in WSAs are administered under the 43 CFR 3820 regulations. When a Plan of Operations is submitted, it includes a reclamation plan for the project area.

Mineralization occurrences are often associated with veins and fracture zones located near the margins of igneous dikes and intrusions. In the past, the USGS and the former US Bureau of Mines have examined various prospects and reported finding deposits that contain values for copper, lead, zinc, zeolites, uranium, niobium, zirconium, thorium, titanium, sulfur, tantalum, beryllium, lithium, cerium, and vermiculite. These mineral occurrences are considered to be uneconomic and marginal in value.

There are currently two approved 3809 mine plans for bentonite. Development potential for additional bentonite, gypsum, uranium, and limestone exist in the decision area. Locatable minerals related mining activity consists of two active bentonite mines, located in Carbon County. Two mining companies have both patented and unpatented claims for bentonite located on the west and southwest flanks of the Pryor Mountains in southern Carbon County.

American Colloid and Wyo-Ben Incorporated (Wyo-Ben) have 151 unpatented placer claims encompassing over 3,000 acres.

American Colloid produced approximately 485,000 tons of bentonite during 2008 with a value of around $60.00 per ton. The company has operated under a State of Montana Mining and Reclamation Plan since 1972. Under federal surface management regulations (43 CFR 3809), this plan was accepted by BLM in 1981. American Colloid has since patented 3,584 acres and has an additional 3,739 acres of unpatented federal claims, for a total of 7,323 acres in their permit. Wyo-Ben produces bentonite from patented and unpatented claims under their plan which was approved in 1999. It currently produces an average of 32,000 tons per year from its Montana operations.

### 3.17.4.6 Mineral Materials

There are 15 active sites for mineral materials (sand, gravel, clay, stone, scoria and borrow materials) in the planning area. Mineral material permits by county in the planning area are shown in Table 3-50. Saleable mineral production in the decision area was 6,500 cubic yards for a value of $3,250 from 100 acres of federal land.

BLM would dispose of salable minerals on unpatented mining claims only for a public purpose when no reasonable alternative exists. Salable mineral sites would have an approved mining and reclamation plan and an environmental analysis prior to being opened. Mineral material would be sold at a fair market value to the public, but would be free to state, county, or other local governments when used for public projects. Mineral material sales would be processed on a case by case basis.

Saleable minerals in the decision area consist of sand, gravel, clay, building and decorative stone, scoria, and borrow materials which is used for road and other construction activities. Common fill that cannot be separated from the soil at the surface may be considered as being a right associated with the surface estate. BLM issues permits for the sale of surface materials under the Materials Act in the same manner as mineral materials associated with the subsurface rights.

**Table 3-50 Claims and Saleable Mineral Permits in the Planning Area**

| County | Lode Claims | Placer Claims | Saleable Minerals permits |
|---|---|---|---|
| Big Horn | 0 | 0 | 2 |
| Carbon | 82 | 151 | 12 |
| Golden Valley | 0 | 0 | 0 |
| Musselshell | 0 | 0 | 0 |
| Stillwater | 613 | 11 | 1 |
| Sweet Grass | 380 | 2 | 0 |
| Wheatland | 0 | 0 | 0 |
| Yellowstone | 0 | 0 | 0 |
| **Total** | **1,075** | **164** | **15** |

**Note:**
Source:

Most of the sand and gravel mining operations in the planning area are on private lands containing alluvial gravel deposits. Some topographically higher terrace gravel deposits exist on federal lands, however these are not as easily accessible as the alluvial valley deposits. Average annual production of sand and gravel from federal lands in the planning area is on the order of 5,000 to 10,000 cubic yards with a current unit royalty value of $0.50 per cubic yard (current market value [2008]).

Building and decorative stone is abundant throughout the planning area. Decorative stone is primarily a commercial type referred to as "moss rock," or a lichen covered sandstone. There are no active permits for the removal of decorative stone in the planning area; however, an average of 100 tons per year could be expected to be produced at scattered locations throughout the planning area. The unit royalty value of moss rock is approximately $20 per ton (2008 current market value). However, this rate can vary.

Some small amount of building stone and rip rap are produced from a community pit on federal land located near Warren, Montana. The stone is normally purchased in small volumes of a ton or less with a market value (2008) of $7.50 per ton. There are about 10 small sales annually from the site, with each sale averaging one ton.

## 3.18 Forestry and Woodland Products

The demand for wood products in the BIFO decision area is widely variable. Incidental amounts of non-forest special products have been sold in the past and have included wildings and mushrooms

## 3.18.1 Forest and Woodland Communities

Forest and woodland communities in the planning area are discussed in some detail in the Vegetative Communities Section.

## 3.18.2 Wood Products

Most forested lands in the BIFO decision area occur in small isolated parcels with poor access, small volume, and limited economic value. Consequently, the sale and harvest of wood products has been chiefly through small negotiated sales. Most sales are identified through public demand, where access is limited and harvest is occurring on adjacent private lands. Volumes sold in the BIFO have averaged less than 50 thousand board feet (MBF) per year over the last decade as shown below in Table 3-51.

**Table 3-51 Wood Products Harvested and Sold in the Planning Area (1994-2008)**

| Wood Product | Volume/15 Years | Average/Year | Average Price/Unit | Monetary Total |
|---|---|---|---|---|
| ***Saw timber:*** Douglas-fir, lodgepole & ponderosa pine | 1,261 MBF | 84 MBF | $ 76/MBF | $ 95,380 |
| Pulp wood | 990 MBF | 66 MBF | $ 1.70/MBF | $ 1,683 |
| Post and pole | 3025 ea | 202 ea | $ .52 ea | $ 1,582 |
| Biomass | 300 tons | 20 tons | $ .01/ton | $ 3 |
| Juniper | 16,530 lbs | 1,102 lbs | $ .05/lb | $ 100 |
| Fuel wood | 479 cords | 32 cords | $ 5.00/cord | $ 400 |
| Christmas trees | 0 | 0 | | |

**Note:**
Averages reflect 15 years 1994-2008.
Weight factor (computed for burned dry timber) = 12.0lbs/bdft.
Source: BLM 1984

Market price dictates the demand for saw timber and wood products. While there are limited markets for forest products within the decision area, there are markets in western Montana. Current market value for forest products plays a pivotal role in determining when forest products can be economically transported to markets outside of the planning area.

Wildfires are occurring more frequently and with greater intensities, thereby affecting larger areas of forested lands. The past two years have seen larger volumes of saw logs, pulp, and biomass removal as a result of salvage operations in response to large wildfires. Fuel wood sales average approximately 32 cords per year. Historically, few existing markets for pulpwood and biomass have existed. Those markets that are available are generally small and unstable, with low market prices and high transportation costs. However, during the last two years, markets have been available. The type of forest products available in the decision area include, but are not limited to:

- Saw logs
- Posts and poles
- Pulp
- Decorative tree boughs
- Christmas trees
- Fuelwood

## 3.19 Lands and Realty

Public land policy in the United States fundamentally changed with passage of FLPMA, which directed that "public lands be retained in federal ownership, unless as a result of the land use planning procedure provided for in this Act, it is determined that disposal of a particular parcel will serve the national interest…". The lands and realty program is a support program for all other resources and resource uses in the planning area with a goal to manage public lands to support resource program goals and objectives, provide for public land uses in accordance with applicable laws and regulations while protecting sensitive resources and improving public land management through land tenure adjustments. As such, the program responds to requests for ROWs, permits, leases, withdrawals, and land tenure adjustments from outside entities.

The BiFO manages 434,154 acres of surface land and 1,839,782 acres of split estate land in eight counties. Split estate lands are lands where the federal government owns the mineral rights, and the surface rights belong to a different owner. Table 3-52 provides a detailed assessment of land ownership in the planning area.

**Table 3-52 Land Status by County**

| County | Ownership (in acres) | | |
|---|---|---|---|
| | BLM Public Lands (in Planning Area) | Federal Mineral Estate (in Planning Area) | Other (private, state, other federal) |
| Big Horn, MT | 7 | 785 | 2,572,392 |
| *Big Horn, WY | 4,298 | 4,298 | 0 |
| Carbon | 220,556 | 702,819 | 1,101,195 |
| Golden Valley | 7,943 | 68,172 | 745,037 |
| Musselshell | 101,247 | 251,636 | 1,095,462 |
| Stillwater | 5,504 | 251,897 | 1,149,208 |
| Sweet Grass | 15,893 | 348,211 | 1,175,853 |
| Wheatland | 1,333 | 85,319 | 912,886 |
| Yellowstone | 77,373 | 126,645 | 1,618,946 |
| **TOTAL** | **434,154** | **1,839,782** | **10,370,979** |

## 3.19.1 Land Tenure Adjustments and Access

Land ownership (or land tenure) adjustments are those actions that result in the disposal of BLM land and/or the acquisition of non-Federal lands or interest in lands. The FLPMA is the primary authority the BLM uses to make land tenure adjustments such as under Section 203 for sales, Section 205 for acquisitions, Section 206 for exchanges, and Section 209 for mineral conveyances. Other authorities, such as the R&PP Act also provide for disposal. For the purpose of addressing the land tenure adjustments in this planning effort, three categories related to land tenure adjustments were developed and are described below (note: the 1984 BiFO RMP Record of Decision only addressed Retention (Category I) and Disposal (Category III).

- **Category I:** Retention would include all Special Designations (including ACECs, WSAs, national historic trails, national monuments, etc.), lands with wilderness characteristics, archeological sites and/ or historic districts, and lands acquired through LWCF or FLTFA. Lands in Category I would not be transferred from BLM management by any method for the life of the plan.

- **Category II:** Retention/Limited Land Ownership Adjustment (no land disposals through sale) lands in Category II would not be available for sale under Section 203 of FLPMA. However, lands in this category could be exchanged for lands or interest in lands. Some public lands in Category II may contain resource values protected by law or policy. If actions cannot be taken to adequately mitigate impacts from disposal of those lands, those parcels would be retained.

- **Category III:** Disposal (land ownership adjustments, including sale) lands generally have low or unknown resource values or are isolated or fragmented from other public land ownerships making them difficult to manage. Public land parcels in this category are relatively smaller in size (typically 160 acres or less). A listing of the legal descriptions of these disposal parcels can be found in Appendix J. These parcels have been found to potentially meet the sale criteria of section 203(a)(1) of FLPMA and could be made available for sale, however, exchange could have priority over disposal by FLPMA sale.

Table 3-53 shows how lands administered in the BiFO planning area are currently allocated by land tenure category.

**Table 3-53 Land Tenure Category Acreage**

| Current Land Tenure Adjustments | Acres | Percentage of Planning Area |
|---|---|---|
| Retention | 27,207 | 6.3% |
| Disposal | 6,329 | 1.5% |

**Note:**
Source: BLM 1984 ROD

**Table 3-54 Land Exchanges, Acres Disposed/Acquired**

| Exchange | Serial Number | Date | Acres Disposed | Acres Acquired | Geographic Name |
|---|---|---|---|---|---|
| Bull Mountain | MTM-080345 | Feb. 1991 | 3,673.16 (coal) | 7,700.26 | Grove Creek |
| Thaut | MTM-080893 | May 1994 | 320 | 639.6 | Shepherd Ah-Nei |
| Altman | MTM-084895 | Nov. 1997 | 7,411.80 | 379.4 | Sundance Lodge |
| Cub Creek | MTM-087795 | Dec.1998 | 16,510.92 | 4,212.33 | Cub Creek |
| Larsen | MTM-088157 | Feb. 1999 | 2,155.89 | 765 | Four Dances |
| **Total Acres** | | | **30,071.77** | **13,696.59** | |

## 3.19.2 Disposals

Appendix J identifies tracts and legal descriptions from the 1984 RMP (BLM 1984) decision for disposal, as well as those lands identified for disposal by alternative. Since the 1984 RMP (BLM 1984) decision, 22 of the 36 disposal tracts identified have been patented into private ownership. These disposal tracts were conveyed by the above-referenced land exchanges (Table 3-54), with the exception of 2 tracts, totaling 50 acres, which were disposed by direct sale. The Land Tenure Proposal Summary in Appendix J is adjusted to reflect the current management.

The FLPMA requires that public land be retained in public ownership unless, as a result of land use planning, disposals of certain parcels are warranted. Public land must be sold at not less than fair market value and must meet specific FLPMA sale criteria, including:

- Because of its location or other characteristics, it is difficult and uneconomic to manage as public land and is not suitable for management by another federal department or agency; or
- It was acquired for a specific purpose, and the tract is no longer required for that or any other federal purpose; or
- Disposal would serve important public objectives, including possible community expansion and economic development, which cannot be achieved prudently or feasibly on land other than public land and which outweigh other public objectives and values such as recreation and scenic values which would be served by maintaining such tract in federal ownership.

All disposal actions must be coordinated with appropriate landowners and authorities, and each disposal action requires a site specific environmental analysis under the National Environmental Policy Act (NEPA). If a disposal is federally legislated, if is exempt from NEPA review.

The Federal Land Transaction Facilitation Act (FLTFA) is a law, which supplements Section 203 of FLPMA. The FLTFA provides an opportunity for federal land managing agencies to use a portion of the money derived from qualifying public land sales to purchase privately owned, high priority lands from willing sellers.

## 3.19.3 Exchanges

Trading lands or interests in lands (or exchanges) are the primary means by which land acquisition and disposal occur. Exchanges may be made for land or interests in land owned by corporations, individuals, or government entities, and they are voluntary and discretionary transactions with willing land owners (exceptions are congressionally mandated or judicially required exchanges). Land exchanges must be in the best interest of the public and conform to applicable BLM land use plans (LUPs). Further, exchanges are done on a value-for-value basis, based on the fair market value as determined by the Department of Interior Office of Valuation Services.

## 3.19.4 Acquisitions

Land acquisitions may be pursued as an important component of the BLM's land management strategy. Lands and interest in lands are acquired to provide the following:

- Improve natural resource management through consolidation of federal, state, and private lands
- Secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, enhance wildlife habitat, provide access to public waters and public land, and preserve archaeological and historical resources
- Implement specific acquisitions authorized or directed by acts of Congress

Special appropriations approved by Congress, generous donations from concerned citizens, and funding through the Land and Water Conservation Fund have all played a critical role in shaping the acquisition program, as shown in Table 3-55.

**Table 3-55 Land Acquisitions/Donations**

| Name | Serial Number, Date | Acres Acquired | Funding Source |
|---|---|---|---|
| Pompeys Pillar | MTM-080383, Nov. 1991 | 366 | Special Appropriation |
| Weatherman Draw | MTM-098616, Dec. 2008 | 615 | Donation |
| Meeteetse Spires | MTM-099053, Jan. 2011 | 560 | LWCF |
| | **Total Acres Acquired** | **1,541** | **All Sources** |

## 3.19.5 Rights-of-Way, Leases, and Permits

There are more than 300 existing ROWs encumbering more than 11,000 acres in the decision area, as shown in Table 3-56. These ROWs authorize construction, operation, and maintenance of roads, railroads, power lines, renewable energy sites, communication sites, water and irrigation facilities, O&G pipelines, and other uses. ROWs have been granted to other federal agencies, the state of Montana, numerous counties, corporations, and individuals. Annually, over the past 10 years, the BiFO has processed between 8 and 10 new ROW applications or amendments to existing ROW grants.

**Table 3-56 Existing ROWs in the Decision Area**

| Existing Authorization | Number | Acres |
|---|---|---|
| ROW temporary use permits | 6 | 12.6 |
| ROW Roads (acquired, 44LD513 and re-conveyed) | 70 | 1,110.5 |
| Federal Aid Highway, sections 107 and 307 | 20 | 1,146.7 |
| ROW roads RS-2477 | 1 | 98.1 |
| ROW railroads | 2 | 96.9 |
| ROW power lines and sites | 53 | 478 |
| ROW power lines for irrigation projects, acquired and reconveyed lands | 19 | 220.8 |
| Renewable energy wind site testing and monitoring | 1 | 6,097 |
| ROW reclamation project | 8 | 17.9 |
| Communication sites (FLPMA, 1911, Federal and 44LD513) | 9 | 4.7 |
| ROW telephone | 42 | 405.7 |
| ROW water facility and irrigation | 22 | 701.2 |
| ROW oil and gas pipelines/facilities | 49 | 881.1 |
| ROW (other FLPMA, Bundy Fishing Access and DEQ air monitoring site) | 2 | 4.1 |
| ROW roads (other federal – USFS) | 21 | 429.1 |
| **TOTAL** | **325** | **11,704.4** |

**Note:**
Source: Data based on LR2000 report for authorized ROW, dated December 12, 2008.

ROW actions are the most common form of authorization to permit public land usage by commercial, private, or other governmental entities. A ROW grant is an authorization to use a specific piece of public land for specific facilities for a specific period of time. Section 501 of FLPMA authorizes the BLM to issue ROWs over, upon, under, or through BLM public lands for linear and site facilities necessary for transportation and transmission. ROWs for transporting oil and gas products across public lands are authorized under the authority of the Mineral Leasing Act of 1920.

Historically, most ROWs on BLM public lands in the planning area involved roads, O&G development, electrical transmission, and communication sites. In recent years however, access

roads and utilities associated with private land development have become more common. This is especially true in the Grove Creek area in Carbon County, where the land ownership pattern is scattered with private subdivided lands.

Wind and solar renewable resource production is permitted by ROWs through the lands and realty program and are discussed in the Renewable Energy section of this chapter..

## 3.19.6 Utility Corridors

Section 368 of the Energy Policy Act of 2005, PL 109-58 (H.R. 6), enacted August 8, 2005, directs the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate, under their respective authorities, corridors on federal land in 11 western states for oil, gas, and hydrogen pipelines, as well as electricity transmission and distribution facilities. The Designation of Energy Corridors on Federal Land in the 11 Western States Programmatic Environmental Impact Statement (EIS) ROD was approved on January 14, 2009, and amended the 1984 RMP. The BiFO corridor segment is designated as 79-216, a corridor 3,500 feet wide and 5.2 miles in length for multimodal uses, meaning overhead electric transmission and/or pipelines. The corridor follows the existing Express pipeline located east of Warren, Montana and runs from the Wyoming state line in a northwesterly direction into Montana. The preliminary EIS amended selected RMPs, including the 1984 RMP.

Utility corridors are preferred routes for transportation and transmission facilities. Identification of corridors does not preclude location of transportation and transmission facilities in other areas if environmental analysis indicates these facilities are compatible with other resource values and objectives. Further, identification of corridors does not mandate that transportation and transmission facilities will be located there if they are not compatible with other resource uses, values, and objectives in and near the corridors or if the corridors are saturated. Each ROW application is reviewed and analyzed using the environmental data that exist for the area as a basis to evaluate compatibility with existing uses and resource values.

## 3.19.7 Leases, Permits, and Easements

The BiFO currently has no leases in effect nor any easements granted. Two different land use permits authorizing commercial filming and apiary (beekeeping) on public land are, however, in effect. Approximately three short term use permits are issued annually, mostly for PMWHR commercial filming projects.

Leases, permits, and easements provide for use of public lands by the private sector, state, and local governments where uses conform to LUPs and cannot be achieved prudently or feasibly on land other than public lands. Section 302(b) of FLPMA authorizes BLM to issue leases, permits, and easements for the use, occupancy, and development of public lands. Any use not specifically authorized under other laws or regulations and not specifically forbidden by law may be authorized under this authority. Authorized uses include residential, agricultural, industrial, and commercial facilities.

The BLM has rarely issued easements. An easement is usually issued to restrict land use on a parcel of federal land to benefit an adjacent private land area. Such public land restrictions are usually undesirable and are rarely sought by private interests. Leases and permits are more common. Permits, authorized under 43 CFR 2920, are typically for short-term use not to exceed 3 years. Easements, for example a road, are long-term non-possessory and non-exclusive uses. Federal agencies (other than BLM) are specifically excluded from authorization of leases, permits, and easements under Section 302 of FLPMA. However, federal agency use of public lands can be authorized by ROW, withdrawal, or interagency agreement.

Under the authority of Section 501 of FLPMA, the BLM issues leases, permits, and ROWs for enduring surface disturbing uses of public lands that are not in the scope of the mining laws and regulations.

## 3.19.8 Communication Sites

Communication sites are land areas where communications equipment and facilities such as cellular, television, private mobile radio service, and radio are situated. These sites house equipment for multiple users, primarily other government agencies including federal, state, and county. The only commercial communications sites are north of Pompeys Pillar, held by the Burlington Northern Santa Fe Railway; and Wall Creek located north of Roundup and held by Mid-Rivers Telephone Cooperative, Inc. The remaining 3 communications sites are Bridger, Tin Can Hill, and Four Dances. These sites provide communications for federal, state, and local government only. In the fall of 2008, communication site plans were completed for all 5 of the communication sites in the decision area. These sites, however, have not been officially designated as communications sites under the existing RMP.

The location of communication sites is subject to exclusion and avoidance areas. The purposes of the communication site plans include the following:

- Selected management strategy
- Location of new facilities and no build zone
- Access requirement
- Use of existing facilities, shared building/tower space
- Multiple use terms and conditions
- Areas closed or excluded from communication site development

Designating sites provide direction for the following:

- Management direction/philosophy and objectives
- Management constraints (technical limitations, noise floors, compatible uses)
- Electronic conflicts (frequencies and power)
- Environmental concerns (soil stability, earthquake and avalanche hazards, T&E species, migratory birds, cultural and historical)
- Site coverage and area served (population zones for rental purposes).

Several initiatives have been directed to federal agencies regarding telecommunications carriers. These initiatives include:

- President's Executive Memorandum, dated August 10, 1995, states, "1. (a) agencies shall make available Federal government buildings and lands for the siting of mobile service antennas in accordance with: Federal, State, and local laws and regulations"
- Telecommunications Act of 1996
- General Service Administration Bulletin 1997

## 3.19.9 Airport Grants and Leases

The Airport and Airways Improvement Act of September 3, 1982, provides for the conveyance or lease of lands to public agencies for airport and airway purposes. The act requires the lease or conveyance of public lands deemed by the Secretary of Transportation to be necessary for airport and airway purposes, unless the lease or conveyance would unreasonably interfere with the programs of the Secretary of the Interior. There are no airport grants on public lands in the planning area.

## 3.19.10 Recreation and Public Purpose Leases and Conveyances

The BiFO administers four patents covering 297 acres and one expired Recreation and Public Purpose (R&PP) lease which is currently being reclaimed (Table 3-57). There are no pending applications at this time.

**Table 3-57 Recreation and Public Purpose Leases in the Planning Area**

| Current Patents | Use | Acres |
|---|---|---|
| City of Billings | Sanitary Landfill | 160 |
| Hillcrest Foundation | Natural Area Park | 119.47 |
| City of Billings | Methane Gas Monitoring Site | 17.45 |
| Huntley Water and Sewer | Water Pump House | 0.08 |
| **TOTAL** | | **297** |

**Note:**
Source: BLM 1984

The Recreation and Public Purpose Act authorizes BLM to lease or convey public lands to state and local governments and to qualified nonprofit organizations for recreation or public purpose uses. Lands are leased or conveyed for less than fair market value or at no cost for qualified uses. Examples of typical uses under the act are historic monument sites, campgrounds, schools, city and county parks, public works facilities, and hospitals. The land involved must be used for an established or definitely proposed project, and the lessee or patentee must commit to a plan of physical development, management, and use as well as certain other requirements

before a lease or patent is issued. Usually, lands are first leased until development is substantially completed, at which time a patent may be issued.

The BLM periodically reviews areas leased or conveyed under the R&PP Act to ensure continued compliance with the terms and conditions. A lease may be terminated or title to patented land may revert to the United States if the entity involved is not complying with the terms.

### 3.19.11 Withdrawals

Withdrawals are formal land designations that set aside, withhold, or reserve federal lands for a specific public use. Withdrawals accomplish one or more of the following:

- Transfer total or partial jurisdiction of federal land between federal agencies
- Close federal land from operation of all or some of the public land laws and/or mineral laws
- Dedicate federal land to a specific public purpose

There are three major types of withdrawals:

1) Administrative withdrawals made by the president, Secretary of the Interior, or other authorized officer of the federal government's executive branch.

2) Congressional withdrawals legislated by Congress.

3) Federal Power Act (FPA) or Federal Energy Regulatory Commission (FERC) withdrawals: power project withdrawals established under the authority of the FPA of June 10, 1920. Administrative withdrawals are the most common type of withdrawal in the BiFO decision area.

The BLM is responsible for reviewing and making recommendations to designate, revoke, or extend withdrawals. Only the Secretary of Interior, however, has the authority to take action. Table 3-58 shows the areas and associated acreage currently withdrawn from mineral entry in the decision area.

**Table 3-58 Areas Currently Withdrawn from Mineral Entry**

| Area Withdrawn | Acres |
|---|---|
| Weatherman Draw<br>T. 8 S., R. 24 E., PMM<br>sec. 20, S½SE¼, SE¼SW¼<br>sec. 29, E½, E½ W½. | 600 |
| Petroglyph Canyon<br>T. 9 S., R. 26 E., PMM<br>sec. 35, lots 2, 3, 6, 7, SW¼ NE¼, SE¼NW¼. | 240 |
| Britton Springs Cabin and Corral<br>T. 58 N., R. 95 W., 6th PM<br>sec. 20, N½SW¼NW¼. | 20 |
| Crooked Creek Natural Area<br>T. 58 N., R. 95 W., 6th PM<br>sec. 28, NW¼. | 160 |
| Pompeys Pillar National Monument<br>T. 3 N., R. 30 E., PMM<br>sec. 21, lots 23-27 inclusive. | 51 |
| Four Dances Natural Area<br>T. 1 N., R. 26 E., PMM<br>(see case file for legal land description) | 765 |

**Note:**
Source: BLM

## 3.19.12 Land Classifications

Land classification is a process required by law for determining the suitability of public lands for certain types of disposal or lease or for retention and multiple use management.

Some land classifications also close public lands from operation of all or some of the public land laws and/or mineral laws. Land classifications are not considered formal withdrawals; however, they can amount to de facto withdrawals, especially where segregation is involved.

Section 7 of the Taylor Grazing Act of 1934 is now the only existing land classification authority. Before the passage of FLPMA in 1976, all BLM land disposal or lease actions required classification. Since FLPMA, Section 7 classifications are required only for the following disposal/lease authorities outside Alaska:

- Recreation and Public Purpose Act
- State selections
- Desert Land Act
- Indian Allotment Act
- Carey Act

It should be noted that Section 7 classifications, including those made prior to FLPMA, remain in full force and effect until modified or terminated. Also, classifications made under now

repealed authorities such as the Small Tracts Act of 1938 and the Classification and Multiple Use Act (C&MU) of 1964 continue in full force and effect until modified or terminated.

In accordance with a Washington Office directive dated June 18, 1981, the 1984 RMP instructed that all C&MU classifications be examined and, if possible, revoked by the end of fiscal year (FY) 1983. The C&MU classifications for the BiFO were reviewed and revoked in accordance with this directive.

There are currently no pending applications or requests for R&PP leases or patents in the decision area. Since 1984, there has been no activity involving state selections, Desert Land Act, Indian Allotment Act, or the Carey Act.

### 3.19.13 Trespass

Trespass actions involve use, occupancy, and development of the public lands without specific authorization or which exceed the established thresholds of an authorization or of casual use. Casual use is defined by the regulations in 43 CFR 2920.0-5(k) as:

> *(k) Casual use means any short term non-commercial activity which does not cause appreciable damage or disturbance to the public lands, their resources or improvements, and which is not prohibited by closure of the lands to such activities.*

Trespass actions can cause unmitigated damage to public lands and natural resources, and it is the BLM's responsibility to protect the public's best interest in regard to its managed lands. Trespass actions also result in a loss of revenue (rental) to the Federal government. Trespass has been an ongoing problem in the BiFO, and when trespass actions go undetected or are identified and not immediately addressed, there is no incentive to cease trespass activity and no deterrent to further trespass action.

Some known trespass activities include placement of apiaries (beehives); indiscriminate dumping of trash, debris, and household wastes; farming/irrigation of public land; road construction; and construction of other utility related features. Agriculture trespass and trash dumping are the most common type, with numerous small acreages involved. The BiFO prefers to resolve and rehabilitate trespassed agricultural lands rather than authorize their use under a 2920.

The BiFO typically resolves one to three cases each year, with some situations being resolved at the lowest informal level. Other situations may call for more formal resolution including action from BLM law enforcement. Trespasses may involve considerable expense for a Cadastral Survey land survey to determine property boundaries, rehabilitation of agricultural trespass areas, and dump clean ups. In trespass situations that demand legal resolution, the BiFO has demonstrated resolve in working with the DOI Field Solicitor and the US Attorney. There are currently no trespass situations identified in the decision area that would require the use of a FLPMA section 203 direct sale for resolution. Every effort is made to use good judgment and restraint in resolving trespass situations at the lowest level possible with the goal of converting the trespasser into a cooperator and respecting the current public land boundaries.

Trespass resolution involves cessation of the unauthorized use, occupancy, or development and may require removal of the unauthorized facilities or appropriate authorization of that use. Three considerations are included in trespass abatement.

- Payment of administrative costs to resolve the trespass.
- Payment of fair market value for the period of unauthorized use
- Rehabilitation and restoration of affected public lands

## 3.20 Livestock Grazing

Livestock grazing addresses domestic animal grazing in the decision area and is authorized on BLM administered lands by the Taylor Grazing Act of 1934, the Federal Land Policy Management Act of 1976 (FLPMA), and the Public Rangelands Improvement Act of 1978. For example, the Taylor Grazing Act creates Section 3 lands and Section 15 lands. Section 15 lands are disconnected, non-contiguous tracts that are not contained in grazing districts. Section 3 lands are located in grazing districts and are administered by the Secretary of the Interior through a system of preferential grazing permits.

Approximately 421,627 acres of BLM administered public land in the BiFO planning area are in grazing allotment boundaries and are managed in accordance with the 1984 RMP (BLM 1984) (see Range Allotments - Map 122). There are 5,961 acres that are not allotted, and this acreage includes small isolated parcels outside existing allotment boundaries and areas in allotment boundaries with no permitted livestock grazing. Livestock that graze on BiFO managed lands are primarily cattle with some sheep and domestic horses. Relative numbers of these types of livestock have not varied much over the past 10 years.

There are 382 grazing allotments in the decision area. In addition to BLM public land, these allotments may contain other lands (USFS, state, and private). There are 310 grazing authorizations for these allotments. Total permitted use is 62,619 animal unit months with 7,746 animal unit months in suspension. An animal unit month (AUM) is the amount of forage needed to feed a cow, one horse or five sheep for one month. Total permitted numbers change frequently due to conversions of the class of livestock and changes in allotment or livestock management. Three hundred (97 percent) of the authorizations are for cattle grazing. Seven authorizations are for horse/burro grazing, and three authorizations are for sheep.

### 3.20.1 Bureau of Land Management Grazing History

The Bureau of Land Management (BLM) manages large areas of Public Lands in the western United States. The history of the BLM began in 1934.

The General Land Office (GLO) managed grazing of public lands outside forest perimeters prior to 1934. Comprehensive management of these lands was initiated in 1934 when Congress passed the Taylor Grazing Act. The Grazing Service was established with the implementation of the Act. Specific tasks within the Act included: establishment of a permit system, organization of grazing districts, fee assessment, and consultation with local advisory boards. In 1946, the Grazing Service was combined with the General Land Office to create the BLM.

In the late 1960s and early 1970s, a shift in public attitude regarding the use of public land emerged. Congress passed the National Environmental Policy Act (NEPA) in 1969, directing land managers to consider the environmental consequences of activities on federal lands. As a result of the NEPA and the Natural Resources Defense Council (NRDC) v. BLM decision in 1973, Environmental Impact Statements (EISs) were prepared for every resource area administered by the BLM. One purpose of these EISs was to address the status of grazing and to develop an approach to meet long term goals of grazing on public land.

In 1976, Congress passed the Federal Land Policy Management Act (FLPMA) which requires that public domain lands be managed for multiple-use. FLPMA also reaffirmed BLM's authority to reduce livestock numbers if necessary. FLPMA also provided for the preparation of Allotment Management Plans (AMPs) in consultation, coordination, and cooperation with permittees for each grazing permit. This requirement integrated the development of AMPs into the permit process. The Public Rangeland Improvement Act (PRIA), passed by Congress in 1978, established a grazing fee formula that sets and adjusts annual fees for grazing on public domain land.

In 1986, a management approach was initiated with the goal of monitoring the long term and short term effects of grazing. The objective of monitoring was to provide a long term database that would allow for the identification of specific problem areas and management actions necessary to correct those problems. The method implemented was an "allotment evaluation" process with a 3 to 5 year data compilation interval.

In August of 1995, new regulations were enacted that changed methods and administrative procedures used by the BLM in its management of public lands. Commonly referred to as Rangeland Reform '94, these regulations directed the establishment of standards and guidelines to "achieve properly functioning ecosystems for both upland and riparian areas." In addition, these regulations changed how the BLM manages and permits grazing allotments.

Grazing Standards and Guidelines for Montana/ Dakotas were approved by the Secretary of the Interior on August 12, 1997.

*Management Eras (Mid-1960s to 1980)*

The "adjudication" of BLM grazing permits occurred over a period of approximately fifteen years, from the mid 1950's into the late 1960's. Adjudication consisted of establishing the extent of historical grazing on allotments and included a review of the following factors:

*Priority Use* - Priority use meant establishing priority grazing use prior to the Taylor Grazing Act. All priority period use claims were subject to validation and constituted a primary permit preference limitation.

*Base Property Production* - All BLM Districts imposed a minimum base property requirement, predicated either on land or water. Such assets as privately owned base property, hay fields, hay stacks, pastures, and water rights were inventoried. Privately owned water flows were measured, and production was calculated. If the existing grazing allocation exceeded the

maximum allowable base property production ratio, the grazing permit was subject to reduction.

*Public Land Carrying Capacity* - During the adjudication period, a one-point-in-time carrying capacity survey was conducted of all grazing allotments. After meeting the first two tests, if the existing grazing allocations exceeded the surveyed carrying capacity, the grazing permit was subject to reduction. If the carrying capacity met the permitted numbers no AUM reductions were realized.

The collective results of applying these three limiting factors determined the amount of "adjudicated grazing privileges." Adjudicated permits were also referred to as "Base Property Qualifications" that were subject to change and refinement as further site specific information became available. The adjudicated grazing permits also included a number for historical suspended AUMs. Suspended AUMs were those AUMs above the number of adjudicated AUMs that had historically been grazed on BLM lands.

After the adjudication process ended, the formal implementation of "grazing management" began by the BLM. Grazing management systems were developed and incorporated into allotment management plans (AMPs). As AMPs were implemented, a second round of grazing permit adjustments generally occurred. This management phase was well underway by the mid-1960 and progressed until the mid-1970's when the NRDC lawsuit required a shift in management toward the development of environmental impact statements.

Most AUM reductions during this period were based on results of BLM Soil-Vegetation Inventory Method (SVIM) surveys, reported in the earliest grazing EISs. Protests from the range livestock industry and professional range management specialists caused the SVIM process to be reevaluated and it was demonstrated that one-point-in-time surveys could not be used to calculate rangeland carrying capacity in an accurate and consistent manner. The BLM issued a decision discontinuing SVIM surveys and began a program based on utilization and vegetation trend monitoring. Resultant monitoring data are used to evaluate whether or not grazing practices have been successful at meeting objectives established in resource management plans, rangeland program summaries, and AMPs.

*(BLM initiated a selective management process to prioritize expenditures of limited range management funds. Allotments were grouped into categories according to their resource potential, current management status, and complexity of resource issues. Allotments classified as "I" were to be managed to Improve current condition; allotments classified as "M" were to be managed to Maintain satisfactory conditions; allotments classified as "C" were to be managed Custodially while protecting existing resource)*

*Management Era (1980 to Present)*

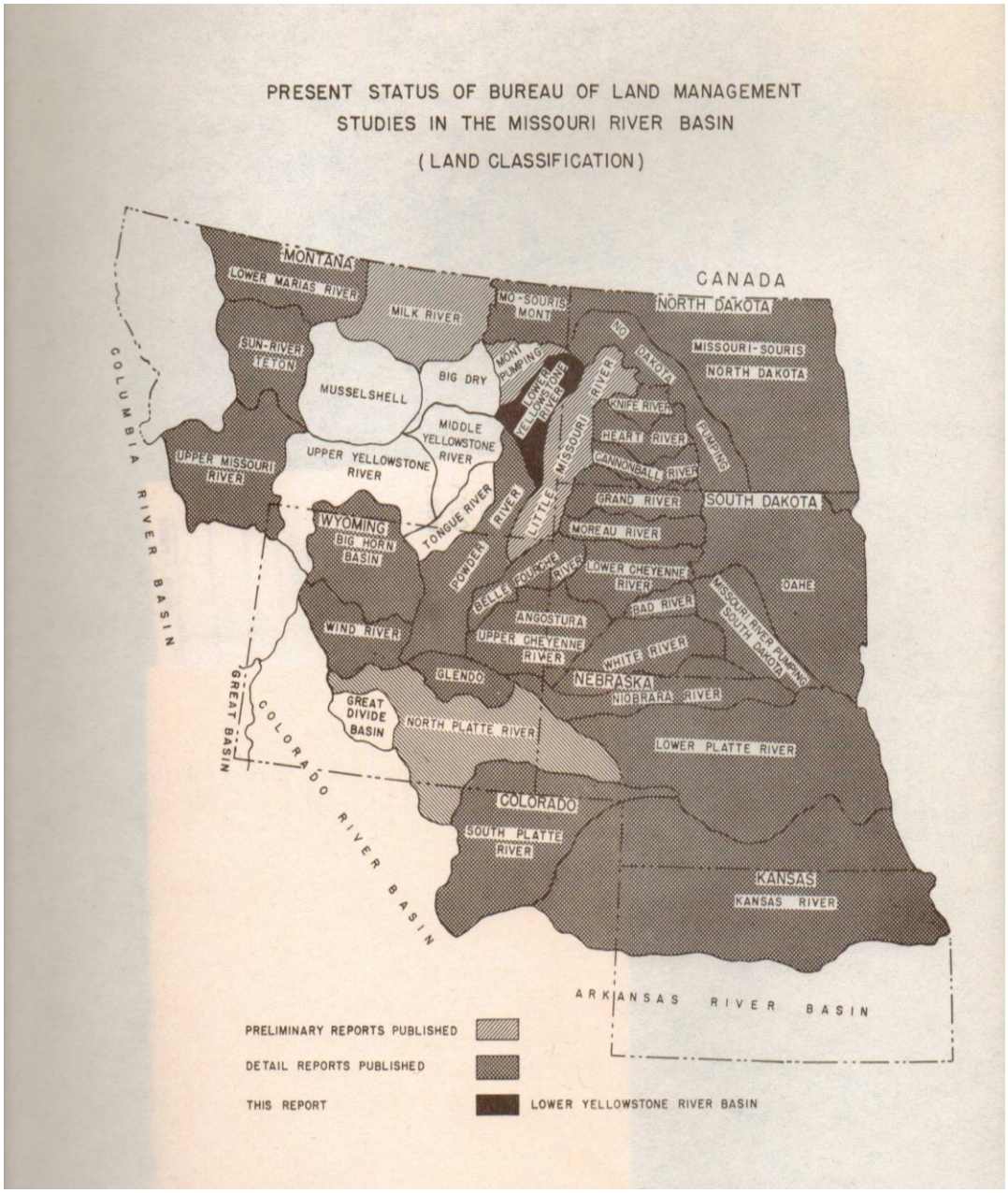
In 1986, the BLM Washington office issued Instruction Memorandum-1986-706). This memorandum instructed that monitoring evaluations be conducted of all "I" and "M" management category allotments. Each allotment evaluation would result in either grazing agreements, issuance of grazing decisions, or documentation to the allotment file concerning grazing management. Allotment evaluations were performed as monitoring results for a five-

year period became available. These evaluations summarize vegetation condition and trend, and provide data so personnel may interpret how the current livestock use, wild horse use, precipitation, wildfire, and other factors influence vegetation changes. Each allotment evaluation concluded with specific management recommendations. Management changes were implemented in the years following evaluation, either through agreement or decision. Management actions included reduction in livestock numbers, changes in grazing management such as implementation of a grazing system, or a change in season of use.

In August of 1995, new regulations were enacted. These regulations directed the establishment of standards and guidelines to "achieve properly functioning ecosystems for both upland and riparian areas." Although, actions to revise these regulations have been initiated, litigation has prevented any significant changes from taking place.

From 1956 through 1972, the BLM conducted a classification of public lands within the Miles City Field Office (Figure 3-17). These are typically referred to as the "Missouri River Basin Surveys". From this effort eight separate reports were generated, which provided the grazing use by Animal Unit Months (AUMs) for all BLM lands at the time of survey.

**Figure 3-17 Grazing Land Classification**




The process to estimate the available forage for livestock grazing was conducted by trained individuals and involved intensive vegetation sampling (clipping, weighing, and ocular estimation). The BLM, in cooperation with grazing advisory boards, used the information to make adjustments so the AUMs allocated to a grazing permit. This cooperative effort resulted in decrease, increase, or no change being implemented for every grazing permit in the field office. These changes were implemented in a timely manner and completed prior to 1975.

The BLM organization regarding the Billings Field Office has varied in the past. Prior to 1983, the Billings Field Office was part of the Lewistown District. In 1984, the Billings Field Office became part of the Miles City District. The Billings Field Office was part of the Miles City District until 1998. In 1999, the Billings Field Office became a stand-alone field office and currently remains a stand-alone field office.

Throughout the multiple organizational changes, the Billings Field Office boundary (Planning Area) has remained relatively unchanged. However, small changes have occurred. In the 1960s, the grazing administration on several grazing allotments near the Montana/Wyoming state line was transferred to the BLM Wyoming Cody Field Office. Included in this transfer were approximately 29,000 acres of public land and 2,237 AUMs.

In 1984, while the Billings Field Office was still part of the Miles City District, the current Record of Decision (ROD) for the Billings Resource Management Plan was signed. This ROD authorized 62,437 AUMs annually. Any reductions in livestock use would be phased in over five years, according to the BLM grazing regulations which were substantiated by monitoring and consultation. Since this ROD was signed, some reductions were made either by permitting, by operator request, or voluntary preference reductions in actual use. The 1992 Range Program Summary (RPS) reflects total active preference for the Billings Field Office of 58,324 AUMs or approximately 93 percent of the AUMs initially authorized in the 1984 ROD. Additionally in 2011, the Billings Field Office billed 49,413 AUMs. This represents 79 percent of the AUMs authorized by the 1984 ROD (82 percent if you take the WY CFO off the ROD authorization total).

## 3.20.2 Grazing Permits and Leases

Grazing use in a designated allotment is authorized through issuance of grazing permits or leases. Permits and leases and attendant activity plans describe livestock class, intensity, duration, and timing of grazing as well as fences, water developments, and other range improvements to be installed. Permitted use is defined as the total number of AUMs in a grazing allotment that BLM has allocated for livestock use. Table 3-59 shows each county's acreage by preference codes. Grazing preference can only be used by qualified operators that own or control land suitable as base property. BLM analyzes effects of proposed grazing according to the NEPA process and prepares an appropriate environmental document prior to permit issuance or renewal. Most permits and leases are valid for a period of 10 years.

The resource demand by domestic livestock is considered to be the total of current authorized (permitted) use (62,619AUMs) and suspended use (7,746 AUMs). Suspended AUMs reflect a temporary withholding from active use, through a decision issued by the authorized officer or by agreement, of part or all of the permitted use in a grazing permit or lease.

**Table 3-59 Summary AUMs by County and Preference Code in the Planning Area (Calendar Year 2008)**

| Number of Permitted & Suspended AUMs by County | | Section 03 | Section 15 | Total |
|---|---|---|---|---|
| Big Horn | Permitted | 39 | 103 | 142 |
| | Suspended | 24 | 0 | 24 |
| Carbon | Permitted | 13,435 | 279 | 13,714 |
| | Suspended | 2,086 | 0 | 2,086 |
| Golden Valley | Permitted | 100 | 32 | 132 |
| | Suspended | 0 | 0 | 0 |
| Musselshell | Permitted | 24,822 | 1,143 | 25,965 |
| | Suspended | 822 | 0 | 822 |
| Stillwater | Permitted | 0 | 897 | 897 |
| | Suspended | 0 | 0 | 0 |
| Sweet Grass | Permitted | 0 | 2,485 | 2,485 |
| | Suspended | 0 | 63 | 63 |
| Wheatland | Permitted | 6 | 186 | 192 |
| | Suspended | 5 | 0 | 5 |
| Yellowstone | Permitted | 11,028 | 318 | 11,346 |
| | Suspended | 4,695 | 51 | 4,746 |
| **Total Sum of County Permitted** | | **49,430** | **5,443** | **54,873** |
| **Total Sum of County Suspended** | | **7,632** | **114** | **7,746** |
| **Grand Total** | | **57,062** | **5,557** | **62,619** |

**Note:**
*Numbers may vary due to fluctuations in permitted AUMS in calendar year and query parameters.
Source: USDI Bureau of Land Management, Rangeland Administrative System

Details of management may be incorporated into an Allotment Management Plan that becomes part of the lease or permit. These plans include grazing instructions specified to meet resource condition, sustained yield, multiple uses, economic, and other objectives.

The BLM authorizes permittees to use the land for grazing by establishing an allocated amount of forage a permittee may graze on an allotment (this is referred to as "active use"). A permittee may enter temporary non-use status when operators do not wish to graze for financial, operational, or related reasons or where resource conditions do not allow for grazing. Alternatively, if excess resource is available as a result of favorable weather and good growth conditions, the BLM may temporarily authorize the permittee to graze in excess of the established level of use. If the permittee chooses to allow another operator to graze livestock on their permitted allotments, livestock control agreements must be filed with and approved by the BLM Authorized Officer.

## 3.20.3 Range Health Standard Assessments

The Montana/Dakota's Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM EIS, 1997) addressed resource conditions for soils, riparian systems, upland vegetation, wildlife habitat, T&E species, and air and water quality (BLM, 1997).

Resource conditions on each allotment are evaluated through assessment and monitoring. From these assessments, potential impacts of grazing are evaluated in the context of standards for rangeland health and guidelines for grazing administration. A BLM interdisciplinary team evaluates allotments in accordance with established rangeland health standards and guidelines. Standards are descriptions of desired conditions of the biological and physical components and characteristics of rangeland. Guidelines are management approaches, methods, and practices intended to achieve a standard. Refer to Appendix S for number of allotments and acres under each category (i.e. Meeting All Standards, Not Meeting Standards, But Making…etc.)

Allotment evaluations include identification of factors influencing resource conditions. Where current grazing management practices or levels of grazing on public lands are a significant factor in failure to achieve rangeland health standards, BLM has until the next grazing season to begin implementing corrective actions.

Corrective actions may include adjustment to grazing duration, timing, intensity, forage utilization, or installation or implementation of range improvement projects. Permittees, interested public, and other agencies are consulted and actions are analyzed according to the NEPA process prior to implementation of corrective actions.

## 3.20.4 Guidelines for Grazing Management

Guidelines for grazing management include methods and practices deemed appropriate to ensure standards can be met, or that significant progress can be made, toward meeting standards. Guidelines are BMPs, treatments, techniques, and implementation of range improvements that help achieve rangeland health standards. Guidelines are flexible and are applied in site specific situations. Guidelines may be adapted or changed when monitoring or other information indicates the guidelines are not effective or a better means of meeting applicable standards exists.

The grazing regulations under 43 CFR 4180.2(e) requires that minimum state or regional guidelines must address the following:

- Maintain or promote adequate amounts of vegetative ground cover
- Maintain or promote subsurface soil conditions
- Maintain, improve, or restore riparian-wetland functions
- Maintain or promote stream channel morphology
- Maintain or promote appropriate kinds and amounts of soil organisms, plants and animals
- Promote the opportunity for seedling establishment
- Maintain, restore, enhance water quality
- Restore, maintain or enhance threatened and endangered (T&E) habitat

- Restore, maintain, enhance T&E candidate and special status species' habitat
- Maintain or promote native populations and their communities
- Emphasize native species in the support of ecological function
- Only incorporate the use of non-native plant species when native species are not available or are incapable of achieving proper functioning condition.

## 3.20.5 Range Improvement Projects

Range improvements are installed and projects are implemented to improve condition or facilitate resource management. Most range improvements in the decision area consist of items such as fences, wells, and spring developments. Fences are used to keep permittees' livestock separate, control seasonal use, and prevent grazing in selected areas. Water improvements help improve livestock distribution and alleviate pressure on natural water sources and provide water for some wildlife species.

Range improvements can be authorized on public land under a Cooperative Range Improvement Agreement or Range Improvement Permit. Cooperative Range Improvement Agreements are used to authorize permanent structural improvements such as fences, wells and reservoirs, and assign maintenance responsibilities to the permittee/lessee. Range Improvement Permits only authorize installation of removable improvements such as livestock handling facilities. Proposed projects funded by BLM are prioritized based on evaluation of the need and costs as they relate to expected benefits. All improvements are constructed according to BLM standards and specifications.

The BLM will apply for new water rights for water sources on BLM land under the same state laws and regulations as all other appropriators; except in cases where water use is specifically protected by federal law or executive order. Within the decision area, BLM filed 722 water right claims. These sources include springs, pothole lakes, reservoirs, and wells. Private parties and other government entities filed an additional 45,320 water rights claims within the decision area. Most of these claims have been reviewed by the Montana Water Court or published for public review to date. For Adjudication Claims, Permits and Total Water Rights by county within the decision area, refer to Appendix U.

## 3.20.6 Prohibited Acts

Permits or leases and preference may be canceled and civil penalties may be applied as a result violating grazing rules. The BLM is responsible for monitoring use on the land it administers.

## 3.20.7 Factors Influencing Grazing

A variety of environmental, economical, and social factors are considered in planning decisions related to livestock grazing. Grazing management is adjusted during permit and lease renewal and in response to these factors when appropriate. These factors may influence grazing management in the planning area.

## 3.21 Recreation and Visitor Services

Federal lands in the planning area provide a broad spectrum of outdoor opportunities that give visitors a range of recreational choices with few regulatory constraints. Recreational opportunities are offered to the public on all BLM administered lands in the planning area where legal access exists.

Approximately 300,000 visitors use public lands in the planning area each year. Primary recreational activities include big game hunting, trapping, hiking, camping, backpacking, picnicking, wildlife and landscape viewing, OHV riding, horseback riding, mountain biking and organized group events. The BLM's Recreation Management Information System (RMIS) report for 2010 listed camping as the most popular outdoor activity in the BiFO; hiking was second, and big game hunting was third. Detailed information on recreational activities in the planning area is shown in Table 3-60.

**Table 3-60 Planning Area Visits and Visitor Use Days by Primary Recreation Activities**

| Recreation Activity | Visits | Percentage of Total | Total Visitor Days |
|---|---|---|---|
| Big Game Hunting | 40,777 | 18.7 | 60,505 |
| Hiking | 40,804 | 18.7% | 60,545 |
| Camping | 42,494 | 19.5% | 63,052 |

**Note:**
Source: BLM RMIS, FY 2010

These diverse recreation uses occur in both dispersed and concentrated recreational settings and vary from primitive to developed opportunities. Travel preferences are also variable as recreationists seek both non-motorized and motorized opportunities. The RMIS reports indicate that most recreation activity in the decision area is associated with dispersed land based use. Two areas in the BiFO decision area are managed specifically for all terrain vehicle (ATV) and motorcycle use (South Hills and a portion of Shepherd Ah-Nei Areas). Two areas in the BiFO decision area are managed specifically for non-motorized day use (Sundance Lodge SRMA and Four Dances Natural Area SRMA/ACEC.

User conflicts have increased with increased recreational use. This is often due to differing expectations and incompatible activities.

BLM Manual 8320 directs the BLM to designate recreational units known as special recreation management areas (SRMAs), extensive recreation management areas (ERMAs), and Public Lands Not Designated (PLND). All public lands within the Field Office will receive one of these classifications in the RMP.

A Special Recreation Management Area (SRMA) is an area with a commitment to provide specific recreational activities and opportunities. These areas usually require a higher level of recreation management. Each SRMA has a distinct primary set of objectives, recreation opportunities, and character settings, as well as a corresponding and distinguishing management strategy. The 1984 RMP (BLM 1984), which designated no SRMAs, was

amended in 2001 to add two SRMAs to the decision area: Four Dances Natural Area and Sundance Lodge Recreation Area.

Lands not designated as an SRMA but which have non-specialized recreational use are managed as extensive recreation management areas (ERMAs). ERMAs are a location where recreation is dispersed and does not require intensive management (although such areas may contain recreation sites). While recreation is not the primary management objective for ERMAs, it is an important consideration. This type of undirected or dispersed recreation management affords visitors the opportunity to create their own experience without services or developed recreational facilities. These areas are characterized by a natural resource setting and a diversity of recreation opportunities.

All other lands not designated as a SRMA or an ERMA are lands where recreation is not emphasized, however recreation activities may occur in equal emphasis with other resources and activities except on those lands closed to public use. The PLND lands are managed to allow recreation uses that are not in conflict with the primary uses of these lands and have minimal recreation program investment.

## 3.21.1 Four Dances Natural Area ACEC and SRMA

Four Dances Natural Area is on a plateau located two miles east of downtown Billings and is bordered on the east by Coburn Road and on the west by the Yellowstone River. The plateau is edged with cliffs that drop 200 to 500 feet to the Yellowstone River (Map 85).

The BLM acquired the Four Dances Natural Area in 1999. Through cooperative efforts of the landowners, the Yellowstone River Parks Association, and the BLM, 784 acres of undeveloped open space in Billings came into public ownership. Approximately 7,000 recreationists visit the area annually. Four Dances is designated an SRMA and ACEC. BLM's objectives for the site are the protection of open space and natural and cultural resources while providing dispersed and low level facility infrastructure for public recreation in Billings. This area provides a unique opportunity for the public to easily access public lands in an urban area.

Recreation opportunities include wildlife viewing, hiking, nature photography, and opportunities for environmental education. This area is for non-motorized day use only. For protection of ACEC values and public safety, the area is closed to horseback riding, use of fireworks, hang gliding, rock climbing, paint ball activities, the discharge of firearms, and exercising pets off leash. Improvements include an interpretive kiosk, vault toilet, host site parking pad, some trail-side benches, and a parking lot. Only day use is allowed.

## 3.21.2 Sundance Lodge Recreation Area SRMA

Sundance Lodge Recreation Area is located near the confluence of the Clarks Fork of the Yellowstone and the Yellowstone rivers. The site includes about 380 acres of river bottom intermingled with the irrigated hay lands. Sundance Lodge was a working ranch before the BLM acquired it in 1997. The Nature Conservancy, the Yellowstone Chapter of Pheasants Forever, and the BLM combined efforts to acquire the land. The area provides dispersed

recreation experiences near the communities of Laurel and Billings, public access to the Clarks Fork of the Yellowstone, and wildlife habitat protection (Map 84).

An agreement with MTFWP and the Yellowstone Chapter of Pheasants Forever enables them to assist BLM with management of the property.

Recreational opportunities include wildlife viewing, environmental education, photography, hiking, biking, and horseback riding on designated roads and trails. Trails in the Sundance Lodge Recreation area provide access while protecting fragile riparian resources from overuse. Accessibility for all visitors allows for a greater sense of personal freedom through increased recreational opportunities. Archery hunting and limited shotgun hunting is available through a block management program with MTFWP. Only day use is allowed. Overnight camping is only allowed through special use permits for special events approved by the BLM. Motorized vehicle use is not allowed. Improvements to the site include a loop parking and turn around, kiosk, and vault toilet.

## 3.21.3 Other Recreation Management Areas

The following sites in the decision area were not designated as SRMAs or ERMAs in the 1984 RMP or subsequent planning efforts; however, the areas provide a variety of recreational opportunities and receive slightly heavier visitor use than other BLM-administered lands in the planning area. Funding and personnel have been directed to these areas over the years to provide visitor services, manage recreation user conflicts, and protect resources for the purpose of providing specific "structured" recreation opportunities. Most are essentially being managed as ERMAs at this time, while the Shepherd Ah-Nei Recreation Area is being managed at a level commensurate with an SRMA. These areas will be addressed in a range of management actions to enhance visitor services and protect resources.

### 3.21.3.1 Acton Recreation Area

The Acton Recreation Area is comprised of 3,697 acres and is located approximately 18 miles north of Billings, Montana. This public land area is one of the few that is easily accessible to recreationists who enjoy non-motorized off road activities such as mountain biking and horseback riding. Approximately 7,000 visitors use the area annually. The Acton Recreation Area is open to camping, hiking, horseback riding, and mountain biking, and the entire area is closed to shooting except during seasons established by MTFWP. Acton provides multiple possibilities for year round use. A small kiosk and identification sign are the only improvements at the site (Map 86).

The 1984 RMP identified 133 acres at the Acton Recreation Area that could be developed for environmental education opportunities for local schools. However, demand for this type of outdoor experience for local schools using specifically designated developed locations, has diminished in the past 10 years, and no further development has occurred.

### 3.21.3.2 Asparagus Point Area

Asparagus Point is comprised of 158 acres and is located 12 miles east of Roundup, Montana. Camping, fishing, and some hunting occurs at the site, however use has not increased substantially over the past several years. It is located on the Musselshell River and is the only public access point for its entire length in the BiFO. There are limited facilities (an access road, directional and site signing, fencing, and a kiosk which were mostly destroyed in the flood of 2011. At this time no determination has been done on rebuilding the site since engineering and financial estimate is required (Map 87).

### 3.21.3.3 Pryor Mountains Area

The Pryor Mountains area is comprised of approximately 81,227 acres and is located approximately 60 miles south of Billings and provides a wide variety of recreation opportunities. The PMWHR and Pryor Mountain, Burnt Timber Canyon, and Big Horn Tack-On Wilderness Study Areas (WSAs), as well as the East Pryor ACEC, the Crooked Creek Natural Area, and the Crooked Creek Natural Area National Natural Landmark are all in the Pryor Mountain area.

More than 100,000 visits to the Pryor Mountains are recorded each year, presumably because of their close proximity to urban areas and the range of recreation activities and experiences accessible there. Viewing the wild horse herd is one of the Pryor Mountain's largest draws. Visitation to the area is especially heavy during late spring when foals are born and through the summer months when horses are in the high open meadows. Other recreation opportunities include hiking, backcountry camping, and viewing wildlife. Other seasonal activities include upland bird and big game hunting, cross country skiing, and snowmobiling. Motorized use is limited to designated roads. A primitive cabin is available for overnight use on a first come, first served basis. There are a number of caves which attract recreational users (Map 89).

### 3.21.3.4 Shepherd Ah-Nei Recreation Area

Shepherd Ah-Nei Recreation Area is comprised of 4,680 acres, is located about 30 miles northeast of Billings, and is an important outdoor recreation resource in the planning area. The entire area is closed to shooting except during hunting seasons established by MTFWP. Visitor opportunities include horseback riding, birding, hunting, and OHV riding.

For management purposes, the recreation area has been separated into three smaller management areas. Each area provides unique recreation opportunities (Map 91).

- **Area 1 (976 acres)** was closed to full sized vehicles in 1985, and current use includes ATVs, motorcycles, mountain biking, hunting in season, and hiking. An additional 640 acres was acquired in 1994 to expand the area. In 2005, the BiFO completed a travel management plan for the area, and 50 miles of trail were designated "open." Improvements include a graveled parking lot, handicapped accessible vault toilet, kiosk, fee station, and unloading ramp. Motorized users are required to purchase a permit to use the area, and all fee

receipts are used for site administration and maintenance to enhance visitor experience.

- **Area 2 (452 acres)** is located across the road (west) from Area 1 and is closed to motorized use. The 1984 RMP (BLM 1984) identified 77 acres for environmental education opportunities for local schools; however interest in this type of outdoor experience has diminished, and nothing further was done. A parking lot, rustic picnic tables, cooking grill, and restroom are located in the northern portion of Area 2.
- **Area 3 (3,212 acres)** is also on the west side of the road and allows motorized use by special recreation permit on existing roads. Permits can be purchased annually or at the fee station for a single day use. Two walk through gates provide access for foot traffic and horseback riders.

### 3.21.3.5 South Hills Area

The South Hills area is comprised of 1,357 acres and is located two miles south of Billings and east of Blue Creek Road on the upper level of a large bentonite deposit. Approximately 2,500 recreationists visit the site annually. South Hills is the only area in the BiFO managed as "open," where motorized cross country travel is allowed. The riding area is open for motorcycle use only (Map 93).

Access to the South Hills riding area is through a small parking area bordered on the west by Old Blue Creek Road and on the north by private land. Riverfront Park, an Environmental Education Conservatory, and developing residential areas are either adjacent to or one quarter mile from the parking lot. A site sign and barrel barriers are the only improvements on site. The parking lot and entrance to the riding area is in need of engineering and reconstruction to address erosion, user safety, and accessibility.

Users have established unauthorized/illegal access routes to the riding area. Access is obtained by riding up extremely steep terrain to the open riding area above. Legal access routes have become rutted and unsafe, and unauthorized access points created by users are dangerous.

The riding area is adjacent to two large subdivisions. Conflicts between recreationists and residents are frequent and result from competing recreational expectations. The 1984 RMP (BLM 1984) decision closed a 70 acre portion of the area to provide a noise buffer to the adjacent residential area and closed 237 acres to all motorized use. The decision also closed the remaining area to all four wheeled vehicles, including ATVs. Currently, unauthorized use is occurring in the buffer area resulting in complaints about noise and dust. In one area, property damage resulted from a mud flow from the parking lot following a heavy downpour.

### 3.21.3.6 17 Mile Area

The area has good local access with a county maintained road along the southern side of the parcel and Montana State Highway 87 along the east side. It is located approximately 17 miles north of Billings, the largest community in Montana and is 2,080 acres in size (Map 95).

The 17 Mile area is a popular and traditional destination for recreational shooting. It has good terrain features with shooting distances ranging from approximately 100 yards to over 500 yards in places, and the backstop is a butte rim with elevations of 50 feet in height. Although surrounded by private lands, there are no buildings within 1.25 miles and they are located in the opposite direction which shooting is occurring. There are no other recreational uses and the area is not grazed commercially.

Previously, this area was the focus of management issues including unsafe shooting practices, littering, and the shooting of animals. BLM management effort to date has included a temporary closure, installation of several kiosks for resource and safety information, public information and outreach, cleanups, and regular visits by BLM staff. Currently community volunteers and users regularly clean the site of shooting debris.

The BiFO has determined that recreational shooting continues to be popular on public lands, and public demand for safe, legal places to shoot remains high. Responding to public requests, BLM staff usually direct recreational shooters to the 17 Mile site.

### 3.21.3.7 Horsethief Recreation Area

The recreational area is located approximately 5 miles west of the community of Roundup, Montana. It is approximately 12,261 acres in size. The main activity is dispersed recreation. The BiFO has installed two kiosks for public information and access education. The Horsethief Recreation Area is open to camping, hiking, horseback riding, mountain biking, and hunting (Map 97).

### 3.21.3.8 Yellowstone River Corridor

The Yellowstone River flows northeast through Montana from its source in the southern Absaroka range in Wyoming to its junction with the Missouri River in North Dakota. The Billings Field Office includes approximately 150 miles of this river between Springdale and Custer, Montana. There are numerous small parcels along the banks and 10 islands managed by BiFO along its course. Typically the western islands have willow and old growth vegetation with an understory of shrubs and grasses. As one progresses eastwards, cottonwoods predominate, but willows, thick shrubs, and even open meadows of range grasses are found. Invasive species such as Salt Cedar, Russian olive, etc. have established themselves all along the river corridors. The small land parcels typically have rolling hills with mixed vegetation and steep bluffs along the banks of the river (Map 99).

Interstate Highway 90 and the mainline of the Northern Pacific Rail Road parallel the Yellowstone River for much of the distance, but not always right by the river and there are rolling hills and curves in the road and Rail Road courses. The islands do provide outstanding opportunities for primitive recreation since access is limited to boat only and the Yellowstone River is a popular fishing destination. However, the Yellowstone River is open for motorboat use, which is a semi-primitive activity. User numbers are not known. Access from the shore is sometimes restricted by private land access issues. The BLM has no developed recreation sites or boat launch sites.

The Yellowstone River varies in width from 74 feet (23 m) to 300 feet (91 m), so fishing is normally done by boat. Mainly, anglers seek Burbot, Channel Catfish, Paddlefish, Sauger, Smallmouth Bass, and Walleye.

The area under consideration for potential SRMA designation varies by Alternative. In Alternative B it is not considered, except for a small portion known as Bundy Island (98 acres) which in Alternative B is considered separately. In Alternative C and Alternative D it is 6,311 acres.

#### 3.21.3.9 Bundy Island

Located in T. 3 N., R. 30 E., Sections 19 and 20. There are two separate islands in close proximity. They are both known locally as Bundy Island. A portion of the larger island has an old and naturally rehabbing agricultural field on it. The approximate total of BLM lands are 80 acres and 24 acres although it varies with river flow (Map 101).

In Alternative B, it is included as a separate SRMA proposal. In Alternative C, Bundy Island is included in the proposed Mill Creek/Bundy Island SRMA, while in Alternative D it is included in the Yellowstone River SRMA.

#### 3.21.3.10 Bundy Island/Mill Creek

In Alternative C, this area includes Bundy Island, described, above, and includes a large tract of public lands (approximately 34,241 acres) adjacent to it and extending to the north. It is used as a dispersed recreational area, popular with hunters and is also a Travel Management Area (TMA) (Map 100)

### 3.21.4 Special Recreation Permits

As authorized by 43 CFR 2932, five types of uses exist for which a special recreation permit (SRPs) is required: commercial use, competitive events, organized groups, vendor permits, and recreation use in special areas. Permits are issued to manage visitor use, protect natural and cultural resources, and provide a mechanism for accommodating commercial recreational uses. As noted above, the Shepherd Ah-Nei Recreation Area charges an Individual Recreation Use Permit (ISRP), for access to a portion of the unit.

The BiFO currently administers 16 commercial SRPs, one competitive event permit, and one non-competitive organized event. Permitted activities include big game and upland bird hunting, horseback riding, guided tours, photography workshops, motocross racing, camping, and hobby rocket launching. In addition, several new applications are received annually for additional commercial, competitive, or organized group events. All permits are processed on a case by case basis with preference given to existing permit holders. Permit lengths depend on activities proposed, the area, and the past record of the potential permittee. Permits may be issued for periods ranging from one to ten years.

During the past five years, applications for SRPs have gradually increased 60 percent, with requests for guided tour applications increasing substantially. Applications for ranch based guided horseback tours and motorized tours for wildlife photography in the Pryor Mountains are requested more frequently than other types. Organized groups, primarily scout groups, frequently request permits to camp on public lands. These permits are usually for overnight campouts for 20 people or less. Fees collected for these special use permits are used to offset administrative costs, monitor approved activities, and protect recreation resource values for future use. The total amount collected each year varies by actual use. The Shepherd Ah-Nei ISRP averages approximately $9,000/year while the other SRPS average approximately $2,000.00/year

## 3.22 Trails and Travel Management

Travel and transportation are an integral part of almost every activity that occurs on BLM public lands. There are numerous routes in the BiFO decision area that connect remote locations to roads. These routes are often unpaved and unimproved, typically consisting of native material such as dirt, gravel, or sand. Approximately 993 miles of routes/ways in the BiFO have been identified.

Existing roads and trails, some of which are user created, provide access to public recreation management areas where most recreation activities take place on public lands in the planning area. However, the public land ownership pattern in the BiFO is highly fragmented, resulting in access difficulties and potential conflict. Conflicts over access can take place whenever ownership is fragmented, along waterways, or where prime resource values occur and recreation or other user demands are high. Even where access exists, the lack of boundary markers and adequate maps often contribute to confusion about access and can result in conflicts among the public, public land administrators, and the owners of associated or intermingled private lands.

Public expectations and demand for motorized and non-motorized recreation has changed substantially since completion of the 1984 RMP (BLM 1984) and the Montana, North Dakota and portions of South Dakota OHV EIS/ROD (January 2001). Advances in motorized and non-motorized recreation travel technology and use have increased the public's ability to traverse conditions and terrains not previously envisioned. In addition, OHV use provides access for non-motorized recreational purposes, and employees of government agencies, ranchers, timber companies, energy companies, and utility providers use OHVs to access and maintain the infrastructure required for the continued operation and maintenance of their facilities.

Most OHV use in the planning area consists of recreational use of ATVs, motorcycles, and other full sized trucks and vehicles. Participation in these recreation activities varies by season, topography, vegetative cover, and number of people taking part in the activity. Public lands in the planning area provide a wide range of high quality OHV opportunities that vary from backcountry to concentrated use areas. In general though, most OHV use occurs on designated roads and trails in the decision area (BLM et. al. 2001).

Motorized OHV use was identified as a planning issue because of concerns related to potential resource degradation that may result from high levels of use (BLM et al. 2001). General estimates of OHV use in the planning area are shown below in Table 3-61. These estimates indicate that the number of trucks used in off highway applications increased 13 percent between 1990 and 1998. ATVs and motorcycles were considered a separate group; however those numbers increased by 156 percent from 1990 to 1998.

**Table 3-61 Estimated Number of Vehicles Used Off-Highway in Montana (1990-1998)**

| Year | Trucks | ATVs and Motorcycles | Total |
|---|---|---|---|
| 1990 | 24,162 | 7,399 | 31,561 |
| 1991 | 23,930 | 8,404 | 32,334 |
| 1992 | 24,706 | 10,020 | 34,726 |
| 1993 | 26,193 | 11,729 | 37,922 |
| 1994 | 26,584 | 13,165 | 39,749 |
| 1995 | 26,919 | 14,072 | 40,991 |
| 1996 | 26,941 | 15,352 | 42,293 |
| 1997 | 27,308 | 16,898 | 44,206 |
| 1998 | 27,423 | 18,953 | 46,376 |

**Note:**
Source: BLM et al. 2001.

Regional recreational use projections indicate that by 2015 the number of ATVs/motorcycles and trucks per year could be 36,249 and 36,797, respectively (BLM et al. 2001). These data suggest OHV use is one of the fastest growing activities in Montana. With the registration of OHVs increasing annually, OHV use is expected to increase on all Montana public lands, including in the planning area.

The BLM uses three primary designations to manage OHV use on public lands: open, limited, and closed. Open designations provide for public driven use and include designated areas and trails where OHV use is subject to operating regulations and vehicle standards set in BLM Manual 1626. Intensive use areas are generally defined as public lands with no restrictions where OHVs are allowed.

Limited and closed designations help protect natural resources and minimize conflicts among various public land users. The limited designation includes areas and trails where OHV use is subject to restrictions, such as limiting the number or types of vehicles allowed, dates, and times of use (seasonal restrictions), or limiting use to existing and designated roads and trails. The closed designation includes areas and trails where OHV use is permanently or temporarily prohibited (BLM et al. 2001).

The 1984 RMP (BLM 1984) attempted to meet OHV use demand on public land while protecting watershed and visual resources and minimizing conflict among OHV users, adjacent landowners, and permit holders. In January 1999, the BLM and the USFS prepared the Off

Highway Vehicle Environmental Impact Statement and Proposed Plan Amendment for Montana, North Dakota, and Portions of South Dakota (OHV EIS) (BLM et. al. 2001). The OHV EIS considered various ways to minimize the potential for resource damage from cross country OHV use. In June 2003, BLM signed the Record of Decision (ROD) for the OHV EIS, which amended the 1984 RMP (BLM 1984). This decision limited motorized travel to existing roads and trails on BLM managed lands in Montana and the Dakotas and became the current standard for establishing management directions related to OHV use on BLM administered lands in Montana, North Dakota, and South Dakota.

The ROD prohibits all wheeled, motorized, cross country travel, including big game retrieval, unless otherwise stipulated. In the absence of other travel plan direction, motorized travel is restricted to existing established roads and trails. Wheeled motorized cross country travel associated with personal use permits is not allowed, unless permitted at the local field office. Overall, a small percentage of the total recreational OHV use in the planning area occurs cross country, suggesting a low frequency of motorized wheeled cross country travel. Much of the motorized wheeled cross country use in the planning area occurs during the fall hunting season (BLM et al. 2001).

Persons with disabilities may be allowed to travel on OHVs in otherwise closed areas on a case by case basis. This requires a request to the BiFO to initiate the exception. Motorized wheeled cross country travel is allowed for any military, fire, search and rescue, or law enforcement emergency. The ROD also directed BLM to identify and complete site specific travel plans to designate roads and trails available for motorized use. The ROD does not address snowmobile use.

The 1984 RMP (BLM 1984), the OHV EIS (BLM et al. 2001) and, for some locations, travel management plans completed in April 2007, set forth these objectives to address motorized use in the decision area:

- In a travel management plan completed in April 2007, Acton Recreation Area designated 6.5 miles of roads open or limited, and closed areas where unauthorized use was occurring.
- OHV use in Asparagus Point Recreation Area was limited to the main access road and parking area (BLM 1984).
- In a travel management plan completed in May 2005, 640 acres of the Shepherd Ah-Nei Recreation Area were designated for authorized use only. Authorized use was defined as BLM employees and persons holding a grazing lease. Motorized use in the northern part of the recreation area west of CA Road (approximately 3,090 acres) was limited to approximately 44 miles of designated roads and trails and authorized use. The southern part (approximately 500 acres) was designated open with the provision that in the event of excessive damage, it could be closed to OHV use entirely. Six miles of trails were designated closed.

- A 70-acre area in the South Hills would be permanently closed to all vehicle use (to provide a buffer zone), and a 1,200 acre portion of the area would be closed to use by four wheeled vehicles (open to motorcycles only).
- In a travel plan completed in February 2008, approximately 50 miles of roads in the Horsethief Area were designated open, and areas where unauthorized use was occurring were closed to motorized use.
- A Federal Register Notice published in XX temporarily closed motorized vehicle use in the Tin Can Hill area.

A Federal Register Notice published in September 2001 updated and corrected errors in the September 25, 1979 and August 4, 1987 road designations based on decisions from the 1984 RMP (BLM 1984). The following roads in the Pryor Mountains were designated open:

- Bear Canyon Ridge Road (#1030)
- Bear Canyon Road (#1014)
- Bent Springs Road (#1039)
- Burnt Timber Ridge Road (#1018)
- Crooked Creek Road (#1017)
- Dandy Mine Road (#1034)
- Demi John Flat Road (#1035)
- East Horsehaven Road (#1030)
- East Petroglyph Canyon Road (#1020)
- Gyp Spring Road (#1015)
- Helt Road (#1016)
- Inferno Canyon Road (#1050)
- Lower timber Ridge Road (#1048)
- Miller Trail Road (#1046)
- Red Pryor Mountain Road (#1022)
- Stockman Trail (#1013)
- Sykes Road East Loop (#1033)
- Sykes Ridge Road (#1019)
- Sykes Spring road (#1052)
- Timber Canyon Road (#1049)
- Timber Ridge Road (#1047)
- Water Canyon Road (#1051)
- West Horsehaven Road (#1021)
- West Petroglyph Canyon Road (#1036)

## 3.23 Renewable Energy

As demand for clean and viable energy to power the nation increases, the occurrence and availability of renewable energy sources on public lands is an important consideration in land management planning. Solar, wind, biomass, geothermal, and hydroelectric power are considered renewable energy resources. It is the BLM's general policy, consistent with the National Energy Policy of 2001, the Energy Policy Act of 2005, the BLM Energy and Mineral Policy (August 26, 2008), and the more current Secretarial Order No. 3285 (March 11, 2009), to encourage renewable energy development in acceptable areas.

Market trends and market value determine the pace and magnitude of proposals to develop renewable energy. The importance of renewable energy sources in the planning area may increase as nonrenewable energy prices increase and as the need for energy grows. Demand for renewable energy is illustrated most recently by the increase in project proposals for various renewable energy technologies throughout the west on both public and private lands. Some of the obstacles to development include a lack of transmission infrastructure for delivery of electricity, difficulties in negotiating power purchase agreements, uncertainty in federal and state regulatory policy and incentives, and acquisition of financing in a challenging economic climate.

In cooperation with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL), the BLM assessed renewable energy resources on public lands in the western United States, including Montana (BLM and DOE 2003). The assessment reviewed the potential for concentrated solar power (CSP), photovoltaic (PV), wind, biomass, and geothermal energy on BLM, BIA, and Forest Service lands in the west. Hydropower was not addressed in the BLM/NREL report. According to the BLM/NREL report, the Billings Planning Unit is rated among the top 25 BLM planning units for wind resource potential, with portions of the planning area exhibiting Class 5 winds (BLM and DOE 2003).

The Western Governors' Association also embarked on a study with the U.S. Department of Energy to define Renewable Energy Zones in the Western interconnection. The results of this effort are documented in the Western Renewable Energy Zones (WREZ) Phase 1 Report (June 2009). The report identifies geographic areas labeled Qualified Resource Areas (QRAs) based on quantification of energy potential and distance to transmission (Western Governors' Association and DOE, 2009). Based on the QRA information as well as additional consideration of sensitive resources and agency protective designations, a map using the concept of "hubs" that visually represent areas that may be the most cost-effective for development was produced as part of the study. One of the three "hubs" identified in Montana in the WREZ Phase 1 Report lies within the boundaries of the BiFO.

The following discussion outlines the affected environment for all types of renewable energy resources in the planning area. However, since wind energy has the greatest potential for development in the planning area, it is discussed in more detail than the other renewable resources throughout this document.

## 3.23.1Wind

The 2003 assessment conducted by BLM in cooperation with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) rated the Billings Planning Unit among the top 25 BLM planning units for wind resource potential, with portions of the planning area exhibiting Class 5 winds (BLM and DOE 2003). Subsequently, the Final Programmatic Environmental Impact Statement (PEIS) on Wind Energy Development on BLM administered lands in the Western United States was released in June 2005 (BLM, 2005) and evaluated the potential environmental and socioeconomic impacts associated with wind energy development on BLM administered lands in 11 western states over the next 20 years (2005 to 2025). The December 2005 Record of Decision (ROD) based on the PEIS analysis amended 52 land use plans, including the 1984 Billings RMP, with the establishment of BMPs to be used when evaluating and authorizing wind energy applications. The ROD also excluded ROW authorizations for wind facilities on BLM-administered lands in Areas of Critical Environmental Concern (ACECs) and in areas that are part of the National Landscape Conservation System (NLCS), including designated Wilderness, Wilderness Study Areas (WSAs), National Monuments, National Conservation Areas (NCAs), Wild and Scenic Rivers, and National Historic and Scenic Trails. Subsequently, the policy contained in the 2005 ROD on ACECs has been revised to defer to the decisions contained in local land use planning documents containing management prescriptions for ACECs.

As a result of this amendment and current policy, wind energy facilities are currently excluded from four WSAs, segments of the Nez Perce and Lewis and Clark National Historic Trails, the Pompeys Pillar National Monument, and six of the seven areas currently managed as ACECs in the BiFO planning area.

The potential for utility scale wind energy development in the planning area is based on methods used in the Final Programmatic EIS on Wind Energy Development (BLM, 2005). Areas are grouped by wind power class derived from 50 meter wind data mapped by the NREL. Wind power classes are divided into seven classes: Poor, Marginal, Fair, Good, Excellent, Outstanding, and Superb. For purposes of analysis, the seven wind power classes are further grouped into three distinct levels: High, Moderate and Low potential for wind power resources (see Maps 151 and 152).

Table 3-62 outlines the number of acres in the BiFO in Wind Class 1 through 7. Class 1-2 wind are considered low, Class 3 winds exhibit moderate potential, and Class 4 through 7 are considered high potential areas. Table 2-1 in Chapter 2 identifies the number of acres of high, moderate, and low potential excluded from development under current management, as well as the other alternatives.

**Table 3-62 Wind Potential in the Billings Field Office in Comparison to All Ownership**

| Wind Power Class & Resource Potential | Acres of BiFO* | Percent of BiFO | Acres of High, Moderate, and Low | Percent of BiFO | Acres in All Ownerships across the Planning Area* | Percent of All |
|---|---|---|---|---|---|---|
| Class 1—Poor | 56,648 | 13% | 220,242 | 51% | 1,024,065 | 9% |
| Class 2—Marginal | 163,594 | 38% | | | 4,076,827 | 38% |
| Class 3—Fair | 146,057 | 34% | 146,067 | 34% | 3,657,997 | 34% |
| Class 4—Good | 44,220 | 10% | 63,547 | 15% | 1,191,761 | 11% |
| Class 5—Excellent | 12,710 | 3% | | | 401,611 | 4% |
| Class 6—Outstanding | 4,052 | 1% | | | 243,258 | 2% |
| Class 7—Superb | 2,565 | <1% | | | 205,316 | 2% |

**Note:**
*This does not include 4,298 acres of BLM land in Wyoming administered by BiFO

In the BiFO, the areas with the greatest wind potential (Class 4 through 7) are located south of Bridger, extending to the Wyoming state line, and on scattered parcels in western Stillwater and Sweet Grass Counties.

In addition to wind power classifications, other elements influence the potential for wind energy development in the planning area. Proximity to transmission lines as well as available capacity on them is a major factor in the siting of wind facilities. Adverse impacts to other resources and resource programs can also affect operation and siting. Large wind turbines affect the visual landscape and can be considered a visual intrusion. Another key consideration is the presence of special status species and potential impacts to both the species and habitat from wind development. In the BiFO, concerns with sage grouse, golden eagles and other raptors, migratory birds, and bats as well as cultural and paleontological resources pose challenges to wind development.

The BLM currently processes wind energy ROW applications under its Wind Energy Development Policy (WO IM 2009-043). On a national basis, BLM continues to develop and refine policy and guidance on wind energy planning and development. Only one (1) wind right-of-way grant has been authorized in the BiFO. In 2003, the BiFO approved construction, operation, and maintenance of a meteorological tower within a 6,097 project area on BLM-administered land to collect wind data to assess wind resources and development opportunities in an area southeast of the town of Bridger. The grant was renewed once, and the "met" towers were removed in 2010, with no subsequent development application. Issues with transmission and the inability to negotiate lease agreements on private lands appear to present challenges to wind development in this area. On a broader scale, indications are that industry may be avoiding siting on public land given the potential to encounter resource constraints and associated time and resources necessary to address public land issues and processes.

Wind farms in Montana mainly occupy private lands, though some include State of Montana school trust lands. Commercial wind ventures currently generating electricity range from the smallest, with 6 turbines producing 9 megawatts at the Horseshoe Bend facility in Cascade County, to the largest with 140 turbines producing 210 megawatts at the Glacier I/ II facility between Cutbank and Shelby (Montana DEQ, 2011). Closer to the planning area, proposals for 40 turbines producing 100 megawatts and 44 turbines producing 79 megawatts are under consideration in Sweet Grass County.

Currently, no applications are pending in the BiFO for either wind site testing and monitoring (met towers) or development (wind farms).

## 3.23.2 Solar Resources

The 2003 assessment conducted by BLM in cooperation with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) did not rate the BiFO among the top 25 planning units for solar resource potential, either for concentrated solar power (CSP), or photovoltaic (PV) technologies (BLM and DOE 2003). Solar energy on BLM land is currently being studied in a six-state area in the Southwest (Arizona, California, Colorado, Nevada, New Mexico, and Utah). The BLM and U.S. Department of Energy released a Draft Programmatic EIS for the six-state area in December 2010. The study includes BLM lands with solar insolation levels greater than 6.5kWh/$m^2$/day and slopes of less than 5%. There are no locations in the planning area that receive the solar insolation levels considered necessary for development of a viable commercial facility based on current technologies. As a result, the potential for development of utility scale solar facilities in the planning area is not likely. To date, the BiFO has not had any expressions of interest in developing solar resources for commercial power production on BLM lands. Due to the unlikelihood of commercial solar development in the planning area, allocations and management related to solar development is not addressed further in this planning document.

The BLM currently processes solar energy ROW applications under its Solar Energy Development Policy (WO IM 2007-097). In the unlikely event applications for solar energy projects are received, the BiFO would apply the policy direction, BMPs, mitigation, and other management directives outlined in BLM's solar program.

## 3.23.3 Biomass Energy and Resources

Biomass power is generated from the energy in plants and plant-derived materials, such as food crops, grassy and woody plants, residues from agriculture or forestry, and the organic component of municipal and industrial wastes. Biomass can be used for direct heating (e.g., burning wood in a fireplace or wood stove) and for generating electricity, or it can be converted directly into liquid fuels to meet transportation energy needs.

The BiFO has not received any applications or authorized any biomass facilities for commercial power production. Lack of available transmission, transportation costs to deliver feedstock, and high costs per kilowatt for electrical generation all pose challenges for biomass energy generation facilities. However, options may exist in the BiFO for biomass utilization.

Generally, production of biomass resources in the BiFO would result from management of forests and woodlands as guided by BLM's forestry program. Use of small diameter wood products or residue is currently encouraged when possible. See the Forest and Wood Products section for additional discussion.

In the event a biomass energy generation facility is proposed on BLM lands, such a proposal would be processed under the lands and realty right-of-way regulations.

## 3.23.4 Geothermal

Geothermal resources are typically underground reservoirs of hot water or steam beneath the surface of the earth. Geothermal energy is produced when this steam or heat is used to turn a turbine to create electrical energy. Geothermal steam and hot water naturally discharge at the earth's surface in the form of hot springs, geysers, mud posts, or steam vents. Geothermal resources also include subsurface areas of hot, dry rock.

The Final Programmatic EIS for Geothermal Leasing in the Western United States evaluates various alternatives for allocating lands as being closed or available for geothermal leasing and analyzes stipulations to protect sensitive resources. The ROD for the Geothermal Programmatic EIS (BLM and USFS 2008) amended existing plans, including the 1984 Billings RMP, to facilitate geothermal leasing on federal mineral estate. In the BiFO, 149,410 acres are open to leasing and 6,768 acres are closed. No electrical production via geothermal resources was projected from any specific areas in the BiFO.

Additional information on geothermal resources can be found in the Energy and Minerals, section. Any proposals for geothermal development on BLM-administered lands would be processed under leasing regulations for geothermal resources, and stipulations, mitigations measures, and BMPS outlined in the ROD for the Geothermal Programmatic EIS would be applied as appropriate.

## 3.23.5 Hydroelectric

Hydroelectric power is generated through use of the gravitational force of falling or flowing water. There is no specific policy guidance or direction for the development of hydroelectric facilities on BLM-administered land as a renewable energy resource. Proposals for hydroelectric power development on any federal lands would generally be authorized under FERC authority in consultation with BLM on mandatory license provisions for BLM-administered lands, based on provisions of the Federal Power Act, as amended. While the potential for construction of major hydroelectric facilities in the BiFO is limited given the lack of major flowing water resources under BLM jurisdiction, the potential for smaller hydro-pumping projects may exist in certain areas. While interest in these types of projects is increasing as an avenue to "firm" electricity generated from wind, the BLM has not received applications for any type of hydroelectric power authorizations on BLM-administered land in the planning area.

Specific allocations and management related to new hydroelectric development is not addressed further in this planning document.

## 3.24 Transportation and Facilities

This section describes transportation facilities and their maintenance as well as other types of facilities administered by the BLM. Travel routes/designations are addressed in the Travel Management section (Section 3.3.4). The BLM's transportation system is critical for management of its public lands. Transportation facilities and access provide people the opportunity to use and travel to and through specific lands in the BiFO planning area, as well as provide for BLM-administrative use of BLM public lands and facilities.

Most of the larger tracts of public lands have legal public access via existing federal, state and county roads. Many smaller tracts of public lands do not have legal access. In most cases, such parcels do not have resource values/demands that justify the costs for acquiring access to these isolated parcels (refer to Appendix J – Land Tenure for information on considering land exchanges and/or acquisitions with regard to access). There are some situations where road segments to and within these parcels are important for a given resource use or to provide through access to other lands and are therefore included in the transportation plan.

### 3.24.1 Federal Roads, Airports, and Railways

A network of federal, state, and county roads provides access throughout the planning area. Traffic volumes on the network are highly variable with the highest volumes found on major roadways in or near the larger communities. Primary federal roads in the planning area include Interstate 90, which bisects the planning area and runs between Hardin and Big Timber, and Interstate 94, which runs between Billings and the area east of Pompeys Pillar NM. These interstate highways carry traffic throughout the region and from surrounding states.

Rail travel through the planning area began with the construction of the Northern Pacific Railway in the early 1880s. The federal government subsidized developing rail lines with substantial land grants that were, in turn, developed for mineral, agricultural, and tourist potential. Currently, passenger service is not available in planning area. The nearest passenger service is an Amtrak stop in Malta, 212 miles north of Billings. Freight service is provided on several main track lines by the BNSF Railway Company.

Billings Logan International Airport is situated just north of Billings. The airport was constructed in 1928, and passenger service began in 1933. The airport services eight airlines flying to multiple destinations, including Canada. Regular commercial air service is not available in any other town in the BiFO planning area.

### 3.24.2 State and County Roads

There are six state highways located in the planning area. Over the past decade the Montana Department of Transportation has upgraded several of these highways, as shown in Table 3-63.

**Table 3-63 State Highway Conditions in the Planning Area**

| Highway | Upgraded |
|---|---|
| Highway 87 from Billings to Roundup | Yes |
| Highway 310 to Bridger and Warren | Yes, to the Wyoming state line |
| Highway 78 to Absarokee | Yes |
| Highway 212 | No |
| Highway 12 from Melstone to Harlowton | No |
| Highway 72 Belfry South | Yes |
| Highway 72 Belfry North | Pending 2010 contract letting |
| Highway 310 from Bridger to the Wyoming State Line | In progress |

**Note:**
Source: BLM 1984

The planning area is connected by a network of county roads. County roads vary from a 30 foot graveled running surface with regular maintenance to native surface roads with a 10 foot running surface and minimal maintenance. State and county system roads (depending on road class) are usually constructed and maintained to higher standards than BLM roads and provide the primary arterial collector road systems for access to and through BLM lands. These state and county system roads are not maintained by the BLM.

## 3.24.3 BLM Roads

There are 216 miles of BLM roads exist in the BiFO decision area, as shown in Table 3-64. BLM roads provide public, agency, and permittee access to and through public lands. Reasonable administrative access is made available to persons engaged in valid uses such as mining claims, mineral leases, livestock grazing, and recreation. Most BLM road usage is defined as casual.

BLM conducts trails and travel management planning to identify areas where foot, mechanized, and motorized vehicle travel is appropriate, restricted, or not allowed. For comprehensive travel management information, refer to Section 3.21.

FAMS now shows:

- Roads – 201 miles
- Primitive roads – 14 miles
- Trails – 10 miles
- Administrative sites – 8
- Recreation sites – 10
- Bridges – 2
- Dams – 5

**Table 3-64 Roads in the Decision Area**

| Segment Name | Segment Length (Miles) | Primitive Road (Yes/No) |
|---|---|---|
| 00301 – Acton Road | 3.6 | N |
| 00301 – Acton Road | 3.8 | Y |
| 00302 – Shepherd Road | 0.2 | N |
| 01001 – Cottonwood Road | 20.4 | N |
| 01002 – Hatcher Pass | 2.5 | N |
| 01003 – Bobcat Pass | 4.6 | N |
| 01004 – Hunt Creek Road | 4.2 | Y |
| 01005 – Cub Creek Road | 9.88 | N |
| 01006 – Long Draw Road | 7.25 | Y |
| 01008 – East Basin Road | 5.85 | Y |
| 01009 – Goblers Knob Road | 3.85 | Y |
| 01010 – Williams Draw Road | 6.05 | Y |
| 01010 – Williams Draw Spur Road | 2.15 | Y |
| 01011 – Hollenbeck Draw Road | 7.4 | N |
| 01013 – Stockman Trail Road | 2.05 | Y |
| 01014 – Bear Canyon Road | 8.2 | N |
| 01015 – Gyp Springs Road | 7.6 | N |
| 01016 – Helt Road | 13.55 | N |
| 01017 – Crooked Creek Road | 6.6 | N |
| 01018 – Burnt Timber Ridge Road | 1.2 | N |
| 01018 – Burnt Timber Ridge Road | 6.9 | N |
| 01019 – Sykes Ridge Road | 17.25 | N |
| 01021 – Horse Haven Road | 6.5 | Y |
| 01022 – Red Pryor Road | 3.0 | N |
| 02301 – Asparagus Point Road | 0.5 | N |
| 1043 – Sand Springs Road | 2.0 | Y |
| 1044 – Williams Draw Spur Road | 1.5 | Y |
| 1038 – Cub Creek/Long Draw Ridge Road | 4 | Y |
| 1037 – Cub Creek Loop Road | 2.5 | Y |
| 1042 – Jones Reservoir Road | 0.75 | Y |
| 1041 – Bear Canyon Spur Road | 0.5 | Y |

| Segment Name | Segment Length (Miles) | Primitive Road (Yes/No) |
|---|---|---|
| 1031 – Bear Canyon Ridge Road | 1.0 | Y |
| 1032 – Bear Canyon Ridge Spur Road | 0.75 | Y |
| 1030 – East Horse Haven Road | 1.25 | Y |
| 1034 – Dandy Mine Road | 2 | Y |
| 1035 – Demijohn Flat Road | 2.75 | Y |
| 1036 – West Petroglyph Canyon Road | 1.5 | Y |
| 1040 – East Petroglyph Canyon Road | 1.0 | Y |
| 1033 – Sykes Ridge Loop East Road | 2.0 | Y |
| 2301 – Asparagus Point | 0.5 | Y |
| 2302 – Steamboat Butte Road | 2.5 | Y |
| 0304 – Shepard Road Spur | 0.09 | Y |
| 0305 – Four Dances Road | 0.1 | Y |
| 0306 – South Hills Parking Area Road | 0.01 | Y |
| 0307 – Sundance Lodge Road | 0.05 | Y |
| 1045 – Robertson Draw Road | 8.0 | Y |
| 1039 – Bent Springs Road | 2.5 | Y |
| 1046 – Miller Trail Road | 3.0 | Y |
| 1047 – Timber Ridge Road | 2.0 | Y |
| 1048 – Lower Timber Ridge Road | 0.75 | Y |
| 1049 – Timber Canyon Road | 1.5 | Y |
| 1050 – Inferno Canyon Road | 1.5 | Y |
| – Water Canyon Road | 1.0 | Y |
| 2305 – North Willow Creek Road | 9.5 | Y |
| 0310 – Acton Spur, W Road | 2.0 | N |
| 0311 – Acton Spur, NE Road | 0.75 | N |
| 0312 – Acton Spur, SE Road | 1.75 | N |
| **TOTAL** | **216.08** | |

**Note:**
Source = AMS

## 3.24.4 Road System Maintenance

BLM maintains its roads under standards set forth in BLM 9100 Manual to protect resources, accommodate users, and maintain its investment. Road system maintenance has focused on

maintaining major recreational access roads, which generally receive most of the traffic volume. The BiFO maintains on an average about 118 miles of roads and 98 miles of primitive roads in the decision area, depending on road conditions and funding availability. Road maintenance generally consists of blading or grading and is usually performed in the summer or fall. Additional corrective maintenance or water drainage work (installation of culverts, drains, or other water management devices) is performed as needed, such as after periods of heavy rainfall. There is no snow removal on BLM roads. Gates and cattle guards on the road system are constructed and maintained using available funds from multiple programs.

## 3.24.5 Facilities

Facilities for administrative purposes facilitate land management responsibilities at several locations within the decision area. All facilities/sites are maintained and upgraded as needed to achieve management objectives for safety, resource protection, and quality recreational experiences. Facilities found to not meet agency needs or which are contributing to resource impacts, are considered for redesign, relocation, closure, or decommission to minimize adverse impacts or conserve funding. Existing facilities are inspected on an established schedule in accordance with the Bureau's Condition Assessment guidance.

The BLM BiFO currently has five developed administrative sites for BiFO staff to store equipment, supplies, and to prepare to work on field oriented tasks. These administrative sites include:

- **The Billings Fire Dispatch Center (located at the Billings Airport).** This site includes a complex of full service buildings housing year round and seasonal field office fire program staff; dispatch center with technical communications equipment; fire fighting vehicles, warehouses, and equipment. The site also serves as a regional service, operations, training, and support center for interagency operations. The BLM leases the land at this site.

- **The Pompeys Pillar Administrative Site.** This site is located at the Pompeys Pillar National Monument (the administrative site excludes the Pompeys Pillar Interpretive Center and the associated recreational facilities (e.g., trails, parking lots, etc.). The site provides support for Pompeys Pillar National Monument operation and for some of the nearby public lands outside of the Monument. There are several buildings which include a warehouse, pump house, and a water treatment system. The BiFO staff uses the buildings for storage, operation, and repair of equipment, construction tasks, and maintenance of the recreation facilities.

- **The Britton Springs Administrative Site.** This site is located on public lands at the south end of the Pryor Mountains and is adjacent to the Pryor Mountain WSA and Pryor Mountain Wild Horse Range. The site consists of corrals, a building for temporary quarters, several outbuildings for storage of feed and supplies. It is mostly used only as a base for temporary operations associated with the local area, which is both remote and at the far end of the field office.

- **The Four Dances Natural Area ACEC Administrative Site.** This site is located on public lands at the Four Dances Natural Area in Billings, and includes a small parking pad with overhead pavilion and includes culinary water and septic. It is used seasonally and provides housing and a contact station for a small staff for local recreational operations. It is a cooperative management site with a non-federal agency partner.
- **The Sundance Lodge Administration Site.** This site is located on public lands in the community of Laurel and is adjacent to the BiFO Sundance Lodge Recreation Area. The site consists of a storage yard for large supplies and equipment, a warehouse and work shop. It is used as the principle work and storage site for the BiFO staff for non-fire purposes and has year-round access.

In the future, new facilities determined to be necessary for permanent, short- or long-term use as part of the Agency mission would be constructed subject to NEPA and approved engineering standards. Consideration would be given to use demands, location, safety, funding, and resource constraints when determining the type of facility necessary.

## 3.25 Special Designations

This section provides information on the current condition of special designations that could be affected by the revised RMP alternatives described in Chapter 2. Special designations discussed in this RMP include:

- Pompeys Pillar
  - National Monument
  - National Historic Landmark
  - Area of Critical Environmental Concern
- Areas of Critical Environmental Concern (ACECs)
  - Bridger Fossil Area ACEC
  - Castle Butte ACEC
  - East Pryor ACEC
  - Four Dances Natural Area ACEC
  - Meeteetse Spires ACEC
  - Petroglyph Canyon ACEC
  - Stark Site ACEC
  - Weatherman Draw ACEC
- Wilderness Study Areas
- Wild and Scenic Rivers
- Pryor Mountain Wild Horse Range
- National Historic Trails

# 3.26 Pompeys Pillar

Pompeys Pillar is an area of critical environmental concern (ACEC), a National Monument (NM), as well as a National Historic Landmark (NHL). The exceptional qualities Pompeys Pillar possesses and an explanation of management processes is described below.

## 3.26.1 General Overview

Pompeys Pillar is a massive sandstone outcrop that rises approximately 127 feet on the banks of the Yellowstone River, approximately 30 miles east of Billings. The monument's premier location at a natural ford in the Yellowstone River, and its geologic distinction as the only major sandstone formation in the area, have made Pompeys Pillar a celebrated landmark and outstanding observation point for more than 11,000 years of human occupation. Hundreds of markings, petroglyphs, and inscriptions left by visitors have transformed this geologic phenomenon-into a living journal of the American West.

Ownership of the mineral estate has not been established due to the complexities arising from the multiple ownerships previous to BLM acquisition. To the extent that the federal government owns the minerals at Pompeys Pillar NN and ACEC, they are withdrawn through a Secretarial Withdrawal (a perpetual withdrawal) that was put in place when the BLM acquired the NM and ACEC.

## 3.26.2 National Monument

Approximately 51 acres at Pompeys Pillar was designated a National Monument (NM) by executive proclamation of the President (Appendix W) in January 2001 for the purpose of protecting the historic and cultural objects described below. This was accomplished through Section 2 of the Antiquities Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431). Section 2 states,

> *"The President of the United States is authorized, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and may reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with proper care and management of the objects to be protected. When such objects are situated upon a tract covered by a bona fide unperfected claim or held in private ownership, the tract, or so much thereof as may be necessary for the proper care and management of the object, may be relinquished to the Government, and the Secretary of the Interior is hereby authorized to accept the relinquishment of such tracts in [sic] behalf of the Government of the United States."*

Ethnographic and archaeological evidence indicates that Pompeys Pillar was a place of ritual and religious activity. Hundreds of petroglyphs on the face of the rock, noted by Clark in his journal, reflect the importance of the site to early peoples. The Crow people, dominant residents of the region when Clark passed through, refer to Pompeys Pillar in their language as

the "Mountain Lions Lodge," and it figures prominently in Crow oral history. Pompeys Pillar also includes the markings and signature of a host of characters from the pioneer past, including fur trappers, Yellowstone River steamboat men, frontier army troops, railroad workers, missionaries, and early settlers. In 1873, Lieutenant Colonel George Armstrong Custer and his men camped at its base, where they came under attack by Sioux warriors.

## 3.26.3 National Historic Landmark

National Historic Landmarks (NHL) are nationally significant historic places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States. In 1965, Pompeys Pillar was officially designated a NHL primarily because of the significance of William Clark's signature panel. The boundary includes approximately 6 acres above the 2,890 foot contour level. In 1983, the same site was listed on the National Register of Historic Places (NRHP) as a significant cultural property. A significant cultural property is a property or a place that is eligible for inclusion on the NRHP because of its association with cultural practices and beliefs that are rooted in the history of a community and are important to maintaining the continuity of that community's traditional beliefs and practices. Pompeys Pillar fulfills both of these descriptions for multiple Native American populations. The Pompeys Pillar NHL is located entirely within the Pompeys Pillar NM boundary and the ACEC is contained in the Historic Zone (as defined below).

## 3.26.4 Area of Critical Environmental Concern

The BLM designated Pompeys Pillar an ACEC in 1996 to protect its cultural and historic resource values. Pompeys Pillar served as an important landmark and traveler register during the exploration and fur trade period and is an important physical reminder of the nineteenth century's westward movement of Euro-American culture. In addition, the Pompeys Pillar property has been and remains a rich habitat for fish and wildlife resources. The wildlife species present there are typical of the riverine environment of the middle Yellowstone Valley in the early nineteenth century. Pompeys Pillar ACEC (432 acres) includes Pompeys Pillar NM (51 acres), designated in 2001, and Pompeys Pillar NHL (six acres) designated in 1965. Table 3-65 provides a summary of special designations at Pompeys Pillar.

**Table 3-65 Pompeys Pillar Designations and Rationales**

| Designation | Acreage | Rationale for Designation |
|---|---|---|
| National Monument (NM) | 51 | Cultural and historic values |
| National Historic Landmark (NHL) | 6 +/- | Cultural and historic values |
| Area of Critical Environmental Concern (ACEC) | 432 | Cultural and historic values |

Three management zones were delineated as part of the Pompeys Pillar ACEC designation to achieve various management objectives, based on ensuring the historic setting and enhancing the visitors' experience: the Historic Zone (90 acres), Historic Zone – Developed (110 acres), and General Management Zone (270 acres).

The RMP planning area for Pompeys Pillar encompasses about 432 acres. Map 170 – Pompeys Pillar Management Zones identifies the various designations and management zones at Pompeys Pillar. Based on public involvement and the environmental setting, Pompeys Pillar was divided into three distinct separate management zones. A brief description of the management zones, character/setting of each zone, and the types of infrastructure currently available and/or allowed in each zone is below.

### 3.26.4.1 Historic Zone

Management objectives of this 29-acre zone are to provide visitor access to Clark's signature and other historic inscriptions and rock art and enhance the visitors' experience through providing landscapes that appear similar to the natural setting Clark viewed in 1806. Landscape modifications would be the minimum necessary for visitor safety and protection of the signature and other rock art. Current facilities in the Historic Zone include a picnic area, sidewalks, contact station, boardwalk to Clark's signature and to the top of the pillar, concrete trail with interpretive signage, gravel entrance road and parking area, electronic surveillance equipment, and vault toilets.

### 3.26.4.2 Historic Zone - Developed

Management objectives of this 54 acre zone are to provide an area where most facilities would be placed. Facilities in this zone are designed to enhance visitor experiences through interpretation and visitor services. Current facilities include an interpretive center; outdoor amphitheater; paved parking, entrance road and drop off loop; picnic area; and interpretive displays.

### 3.26.4.3 General Management Zone

Management objectives of this 349 acre zone are to improve and/or maintain wildlife habitat condition, enhance dispersed recreation opportunities, and utilize agriculture to further general management. These include weed control, soil stabilization, and provision of a food source for wildlife.

## 3.26.5 Current Land Usage at Pompeys Pillar National Historic Landmark and National Monument

Current uses at Pompeys Pillar mainly focus on the historic/cultural recreational experiences for visitors. Pompeys Pillar is used extensively for education by regional schools. Pompeys Pillar is located adjacent to an interstate highway and, as a result, continued and possibly increased use by motorists traveling through the region may occur. The interpretive trail system, outdoor amphitheater, and scenic views offer outstanding opportunities for both local and non-resident visitors.

Pompeys Pillar also offers exceptional recreational activities, including hunting, in the general management zone. Wildlife viewing, photography, and dispersed recreational opportunities are among the most frequently-use visitor uses. There are few public land opportunities along the

Yellowstone River with good physical and legal access. The recent acquisition of the Circle R by MTFWP, across the river, also provides outstanding opportunities. It is likely that the use at Pompeys Pillar will increase. Access for motorized and non-motorized boating opportunities will likely be a publicly-driven demand as river use increases. Geocaching will likely be a growing trend in the future as well. Lands surrounding and/or adjacent to the Pompeys Pillar planning area are important to preserving the historic and cultural viewshed.

## 3.27 Areas of Critical Environmental Concern

The ACEC designation is an administrative designation used by the BLM that is accomplished through the land use planning process. It is unique to the BLM in that no other agency uses this form of designation. The Federal Land Policy and Management Act states that the BLM will give priority to the designation and protection of ACECs during the development and revision of land use plans.

BLM regulations (Title 43 Code of Federal Regulations Subpart 1610) define an ACEC as an area "within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." Private lands and lands administered by other agencies are not included in the boundaries of ACECs. ACECs differ from other special management designations (e.g., wilderness study areas) in that designation by itself does not automatically prohibit or restrict other uses. In order to be designated, special management beyond standard provisions established by the plan must be required to protect the relevant and important values. Further information about these criteria is presented in Appendix E.

### 3.27.1 National Natural Landmark

A National Natural Landmark (NNL) is a nationally significant natural area designated by the Secretary of the Interior. To be nationally significant, a site must be one of the best examples of a biotic community or geologic feature in its natural region. Examples of this natural diversity include terrestrial and aquatic ecosystems, features, exposures, and landforms that record active geologic processes as well as fossil evidence of biological evolution.

### 3.27.2 Laws, Regulations and Policies

Section 202(c)(3) of the FLPMA mandates the BLM give priority to the designation and protection of ACECs in the development and revision of land use plans. BLM Manual 1613 describes the process to nominate ACECs and screen areas for their suitability or ACEC designation. The BLM's planning regulations (43 CFR 1610.7-2) establish the process and procedural requirements for designating ACECs in RMPs and RMP amendments.

## 3.27.3 Existing ACECs

Currently nine ACECs exist in the planning area, including Pompeys Pillar (Section 3.4.2 – Pompeys Pillar) for a total of 37,896 acres. A summary of all the ACECs and the values they protect is in Table 3-66, and more detailed information for each ACEC is provided below. The values for which these ACECs were designated are still present and require continued management attention (Map 159).

**Table 3-66 ACECs in the Planning Area**

| ACEC | Year Designated | BLM Public Land (in acres) | Values |
|---|---|---|---|
| Bridger Fossil Area | 1999 | 577 | Paleontology |
| Castle Butte | 1999 | 184 | Cultural resources |
| East Pryor Mountains | 1999 | 29,550 | Wild horses, wildlife habitat, cultural, historic, paleontological, vegetation |
| Four Dances Natural Area | 2002 | 784 | Cultural and historic resources, scenery, natural hazards |
| Meeteetse Spires | 1999 | 965 | Vegetation, scenery |
| Petroglyph Canyon | 1999 | 240 | Cultural resources |
| Pompeys Pillar* | 1996 | 432 | Cultural and historic resources (1, 2, and 3) |
| Stark Site | 1999 | 799 | Cultural resources |
| Weatherman Draw | 1999 | 4,365 | Cultural resources |
| **Total** | **9 ACECs** | **37,896** | |

**Note:**
*Addressed in Special Designations Section

Source: BLM ACEC amendment 1999
http://www.blm.gov/style/medialib/blm/mt/blm_programs/planning/billings_rmp/amendments.Par.94086.File.dat/acecEA.pdf

### 3.27.3.1 Bridger Fossil Area ACEC

Bridger Fossil Area was designated primarily to protect the paleontological values of the area. The area consists of three separate tracts, one with public access. The Bridger Fossil National Natural Landmark is located in this area. Located in Carbon County, Montana, the area includes the fossil remains of *Deinonychus antirrhopus*, a highly predaceous carnivorous dinosaur from the Cretaceous Cloverly Formation. A recently discovered bone bed contains the remains of numerous juvenile and subadult sauropods. The area is used extensively for the collection of invertebrate fossils and as an outdoor classroom.

To conserve the Bridger Fossil ACEC for future scientific study, the area is managed according to the following management prescriptions. Livestock grazing is allowed, while ROWs, mineral material sales and permits, and O&G leasing are not allowed. Underground explosives for geophysical exploration for O&G are not allowed. Other geophysical exploration methods for O&G are allowed if the method does not damage the paleontology resource. If monitoring

indicates fossil damage as a result of a geophysical activity, it will no longer be allowed. Off-road vehicle use is limited to designated roads and trails. Noncommercial collection of common invertebrate and plant fossils is allowed. The area is managed per VRM Class IV objectives.

### 3.27.3.2 Castle Butte ACEC

Castle Butte in Yellowstone County is a remarkable topographic feature. The butte is composed of relatively soft, friable, bedded sandstones of the upper Cretaceous Hell Creek Formation. Castle Butte was designated as an ACEC due to its cultural values, such as rock art. Paleontological resources, including plant fossils and leaf fossils, are found in the area as well.

To conserve the exceptional rock art for future generations to study and enjoy, the area is managed according to the following management prescriptions. Livestock grazing and range improvements are allowed. Fire is managed with conditional fire suppression. Wood product sales are not allowed. Geophysical exploration for O&G is not allowed on the significant cultural resource sites. Geophysical exploration is allowed (surface methods and vibroseis) in the remainder of the area. The mineral estate at Castle Butte ACEC is privately owned. Additionally, ROWs are allowed when they avoid the significant cultural resource sites. Off-road vehicle use is limited to designated roads and trails. The area is managed per VRM Class II objectives.

### 3.27.3.3 East Pryor Mountain ACEC

This area, located in Carbon County, Montana and Big Horn County, Wyoming, contains several important areas/designations in the ACEC boundary: the PMWHR; the Burnt Timber Canyon, Pryor Mountain, and Big Horn Tack-on WSAs; the Crooked Creek Natural Area; and the Crooked Creek Natural Area NNL. The ACEC has many diverse habitat types and associated wildlife species. The area is rich with paleontological and cultural resources, including early Cretaceous land vertebrates (one of only two localities in North America) and vision quest sites. Although vegetation was not one of the characteristics for which the East Pryor Mountain ACEC was designated, sites of several BLM sensitive plants occur in the ACEC.

To conserve the area for wild horse and paleontological values, provide recreational use and enhance fish and wildlife habitat, the East Pryor Mountains are managed according to the following management prescriptions. Fire is managed with conditional fire suppression. Wood product sales, ROWs, livestock grazing and geophysical exploration for O&G are not allowed. Off-road vehicle use is limited to the designated vehicle ways. Locatable minerals are withdrawn from entry. Mineral material sales and permits, and O&G leasing are not allowed. Noncommercial collection of common invertebrate and plant fossils are allowed. The area is managed per VRM Class II objectives.

### 3.27.3.4 Four Dances Natural Area ACEC

Four Dances is located two miles east of downtown Billings and is bordered on the east by Coburn Road and on the west by the Yellowstone River. The majority of the property is a

plateau 200-500 feet above the Yellowstone River, which command views of many important traditional Crow Indian sites. In more recent history, Will James, internationally known cowboy artist, used a small cabin overlooking the Yellowstone Valley as a retreat. This cabin remains intact on the Four Dances property and appears much as it did in James' time. The Four Dances property is directly across the river from Coulson City, a late nineteenth century steamboat landing and the precursor to Billings. The cliffs on the Four Dances site were also noted by William Clark in 1806. To the extent that the BLM owns the mineral estate at Four Dances Natural Area ACEC a regulatory withdrawal on the mineral estate is in place on the 784 acres. (Map 85 – Four Dances Natural Area ACEC/SRMA)

### 3.27.3.5 Meeteetse Spires ACEC

Meeteetse Spires is located in Carbon County, Montana, at the base of the eastern slopes of the Beartooth Mountains. The spires are formed by a tilted layer of sedimentary rocks at the edge of the Beartooth Uplift and are remnants of upturned Madison limestone. The area draws a variety of interests including hikers, climbers, sightseers, and hunters in the fall. Meeteetse Spires was dedicated as a Centennial Preserve on October 7, 1989, through the efforts of The Nature Conservancy and the BLM. It was created to protect the spectacular scenery and natural beauty of the spires and the ecological habitat for two rare plant species (Map 171 -- Meeteetse Spires ACEC).

To protect and enhance the rare plant *Shoshonea pulvinata* and conserve this scenic area for recreational use, the area is managed according to the following management prescriptions. An easement across state land (T. 8 S., R. 20 E., Section 36) has been obtained. Fire is managed with conditional fire suppression. Selected timber harvests may be periodically necessary to protect the area's overall resource value. Livestock grazing, except for sheep, is allowed. Wood product sales, ROWS, O&G leasing, and mineral material sales and permits are not allowed. Locatable minerals will be withdrawn from entry.

In the sensitive plant area, geophysical exploration for O&G is not allowed by any method. On the remaining area, geophysical exploration is accessed by air only. Exploration is shot holes and above-ground shots. Vibroseis is allowed.

Off-road vehicle use is limited to designated roads and trails, yearlong, in the entire area. The area is managed per VRM Class I1 objectives.

### 3.27.3.6 Petroglyph Canyon ACEC

Petroglyph Canyon is in southern Carbon County, Montana. It is a late prehistoric rock site listed on the NRHP. The site consists of 38 panels of petroglyphs. Human figures dominate the artwork. Materials recovered in excavations at the base of the panels include chipped stone tools, flaking debris, and charcoal. Radiocarbon dating of the charcoal resulted in the dates 1045 to 1260 AD and 565 to 930 AD (Map 171). To conserve this area for future generations to study and enjoy, the area is managed according to the following management prescriptions. Wood product sales, ROWs, O&G leasing and geophysical exploration for O&G are not allowed. Livestock grazing and range improvement are allowed. Locatable minerals are

withdrawn from entry through a regulatory withdrawal on the entire 240 acres. Off-road Vehicle use is closed. The area is managed per VRM Class IV objectives.

### 3.27.3.7 Pompeys Pillar ACEC

Pompeys Pillar ACEC is discussed in Section 3.4.2 – Pompeys Pillar.

### 3.27.3.8 Stark Site ACEC

The Stark Site is in western Musselshell County, Montana. The area is a complex of sites used for bison impoundment and processing, occupations, burials, a rock shelter, rock art, and historic remains. Of the 26 sites recorded, 21 are considered eligible for nomination to the National Register of Historic Places (NRHP) (Map 171). To conserve this area for future generations to study and enjoy, the area is managed according to the following three management prescriptions. Livestock grazing and range improvements are allowed. Fire is managed with conditional fire suppression. Wood product sales, ROWs, and mineral material sales and permits are not allowed. O&G leasing is allowed with a No Surface Occupancy stipulation. Geophysical exploration for O&G is not allowed on the significant cultural resource sites and is allowed (surface methods and vibroseis) in the remainder of the ACEC. Off-road vehicle use is limited to designated roads and trails. The area is managed per VRM Class III objectives.

### 3.27.3.9 Weatherman Draw ACEC

Weatherman Draw in Carbon County, Montana, contains rare archaeological resources. Forty rock art sites, with associated buried deposits, are of concern to contemporary Native Americans such as the Crow and Shoshone. Weatherman Draw is in the Cretaceous Eagle Sandstone. Erosion has produced canyon topography with numerous vertical sandstone exposures (Map 171).

To conserve this area for future generations to study and enjoy, the area is managed according to the following management prescriptions. Livestock grazing is allowed. Fire is managed with conditional fire suppression. ROWs associated with valid existing O&G lease rights are allowed with restrictions. Other ROWs are not allowed. Range improvements are allowed when they do not conflict with the ACEC values. Locatable minerals are withdrawn from entry on 600 acres through a regulatory withdrawal. Wood product sales, and mineral material sales and permits are not allowed. O&G leasing are allowed with a No Surface Occupancy stipulation with no waiver, exception, or modification provisions. The area is closed to geophysical exploration for O&G. Off-road vehicle use is limited to authorized use. The area is managed per VRM Class II objectives.

## 3.28 Wilderness Study Areas

There are four Wilderness Study Areas (WSAs) in the Planning Area, as set forth in Table 3-67. These areas are Big Horn Tack-On, Burnt Timber Canyon, Pryor Mountain, and Twin Coulee.

**Table 3-67 WSAs in the Planning Area**

| WSA Name | WSA Number | Total Acreage | Acres Recommended for Wilderness | Acres Recommended for Non-Wilderness |
|---|---|---|---|---|
| Big Horn Tack-On | MT-067-207 | 2,689 | 2,470 | |
| Burnt Timber Canyon | MT-067-205 | 3,516 | 3,430 | |
| Pryor Mountain | MT-067-206 | 15,590 | 12,575 | |
| Twin Coulee | MT-067-212 | 6,836 | 0 | 6836 |

**Note:**
Source: BLM 1984

BLM Manual 6330 (Management of BLM Wilderness Study Areas) states:

> "*…Wilderness preservation is part of the BLM's multiple-use mandate, and the wilderness resource is recognized as one of the array of resource values considered in the land-use planning process."*

The original wilderness review process outlined under Section 603 of FLPMA had three phases: inventory, study, and reporting to Congress. Public involvement was encouraged in all phases of the process, with opportunity provided for comment, participation, and review. The wilderness inventory was conducted from 1978 to 1980, and excluded Alaska and Oregon and California Grant Lands Act of 1937 (O&C Act) lands managed primarily for timber production. The original inventory focused on roadless areas of public lands of 5,000 acres or more and on roadless islands, but also included areas of less than 5,000 acres that had wilderness characteristics in association with contiguous roadless lands managed by another agency, and areas of less than 5,000 acres that had wilderness characteristics and could practicably be managed to keep those characteristics in an unimpaired condition. Additional WSAs were designated through the BLM land use planning process under the authority of Sections 201,202, and 302 of FLPMA after the reports to Congress were completed in 1993.

Pursuant to the Wilderness Act of 1964, Section 2(c), "wilderness" is defined as

> *". . . an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain . . . an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."*

The FLPMA of 1976 directs the BLM to inventory and study its roadless areas for wilderness characteristics. An area must have the following characteristics to be designated a WSA:

- **Size –** Public lands that are roadless and of at least 5,000 acres in area or of a manageable size
- **Naturalness –** Generally appears to have been impacted primarily by the forces of nature
- **Opportunities –** Provides outstanding opportunities for solitude or primitive and unconfined types of recreation

WSAs also often have special qualities, such as ecological, geological, educational, historical, scientific, and scenic values.

FLPMA mandated that the BLM would inventory and study its lands for their wilderness suitability within 15 years and, based on that review the Secretary of the Interior would forward his/her wilderness recommendations to the President. Recommendations for the BiFO planning area were included in the Montana Statewide Wilderness Study Report released in September 1991 (USDI-BLM 1991b). The Secretary of the Interior and President signed recommendations and forwarded them to Congress before the end of that year. As a result of the inventory and study the four existing WSAs were recommended in the 1984 RMP (BLM 1984).

Only Congress can designate the WSAs established under Section 603 of FLPMA as wilderness or release them for other uses. Therefore, the status of existing WSAs will not change as a result of the BiFO planning process and RMP revision. WSAs will be reevaluated to ensure current management and uses are compatible with the intent of their designation. The BLM's management policy is to continue resource uses on lands under wilderness review in a manner that maintains suitability for preservation as wilderness.

BLM Manual 6330 (Management of BLM Wilderness Study Areas), directs Agency management of WSAs until Congress acts on designation. If Congress designates the areas as wilderness, they would be managed according to the Wilderness Act of 1964, as amended, Public Law 88-577 (16USC 1131-1136). If Congress releases them from wilderness consideration, the areas would be managed as prescribed under the existing RMP management direction.

## 3.28.1WSAs in the Planning Area

### 3.28.1.1 Big Horn Tack-On WSA

Big Horn Tack-On is a narrow strip of land about nine miles long and less than one-half mile wide with 2,470 acres in Montana and 80 acres in Wyoming. The WSA is located between Sykes Ridge Road on the west and the BCNRA to the east.

This WSA is primarily in a natural state with a few dispersed, but fairly well screened, human intrusions. These consist of uranium exploration pits; a wild horse trap in the north along the

west boundary road; vehicle ways, one in the north and one in the south; and the power line on the southeast (Map 161 - Burnt Timber WSA, Big Horn Tack-On WSA and Pryor Mountain WSA).

### 3.28.1.2 Burnt Timber Canyon WSA

The area encompasses an extremely rugged and isolated portion of Crooked Creek Canyon, which has remained relatively free of modern human influences. The WSA is predominantly natural and offers outstanding opportunities for solitude and primitive recreation.

The major drainage, Crooked Creek, supports a genetically pure strain of native cutthroat trout. The creek is not considered an outstanding fishery because the trout are small, and dense brush restricts ready stream access. However, native trout species here have a high intrinsic value and, in 2007, the BLM installed a fish barrier in the upper reaches of Crooked Creek to protect this species (Map 161 - Burnt Timber WSA, Big Horn Tack-On WSA, and Pryor Mountain WSA).

### 3.28.1.3 Pryor Mountain WSA

The Pryor Mountain WSA is 12,575 acres and contains some of the most rugged, isolated portions of the Pryor Mountains. The wide expanses and topographic screening in this area offer outstanding wilderness values. This unit is in the heart of the PMWHR and the free roaming wild horse herd enhances the wilderness characteristics of the area. Human activity is well distributed throughout the WSA. Vegetation and topographic screening significantly limit any detraction from the WSA's extensive natural setting. There are 4,352 acres of the Pryor Mountain WSA which are located in Big Horn County, Wyoming (Map 161 - Burnt Timber WSA, Big Horn Tack-On WSA and Pryor Mountain WSA).

### 3.28.1.4 Twin Coulee WSA

The Twin Coulee WSA is 6,870 acres located on the southeast flank of the Big Snowy Mountains in Golden Valley County, Montana. It consists of steep mountainous topography with several deeply incised drainages. Most of the WSA is made up of a mixed coniferous forest with bunch grasses for an understory. Elevations range from 5,500 to 7,600 feet. (Map 160 – Twin Coulee Wilderness Study Area).

## 3.29 Wild and Scenic Rivers

Congress enacted the Wild and Scenic River Act (WSR Act) on October 2, 1968 to provide a national policy for preserving and protecting selected rivers and river segments in their free-flowing condition for the benefit of present and future generations. Section 5(d)(1) of the WSR Act) (Public Law 90-542; 16 US Code 12711287) directs federal agencies to consider potential wild and scenic rivers in their planning processes. To fulfill this requirement, the BLM inventories and evaluates rivers when it develops or revises an RMP for public lands in a specified area.

A Wild and Scenic River (WSR) study process has two main components: the eligibility phase and the suitability phase. The eligibility phase is conducted during the RMP data gathering stage, and the suitability phase is done during formulation of the draft and proposed RMP.

As part of its RMP process, the BiFO conducted the initial inventory and study processes provided for under the Act. The Final Wild and Scenic River Eligibility Report describes the methodology and process used to identify river segments, assess their eligibility, and for eligible segments, assign a preliminary classification (Ecosystem Management Inc. 2009). The study was completed in April 2009 and is included in Appendix R – Final Wild and Scenic River Eligibility Report. The Eligible Wild and Scenic River Segments map shows eligible river segments in the decision area.

This study considered only BLM administered lands along streams and rivers. Private, state, and other federally administered lands were not part of the study. Currently, no rivers or river segments in the decision area are managed under the Act.

## 3.29.1 Eligibility Phase

Currently, only the eligibility phase of the WSR process is complete. The eligibility phase is undertaken to identify eligible river and stream segments and assign tentative classifications to each. A wide variety of internal and external sources are considered when identifying potentially eligible rivers. The BLM applies standard criteria to identified segments to determine eligibility. A river segment must be free flowing and possess at least one river related value considered outstandingly remarkable to be eligible.

As part of the land use planning process for the RMP, the BiFO interdisciplinary team analyzed all river and stream segments that may be eligible for inclusion in the National Wild and Scenic River System (NWSRS). This included screening rivers to identify those with BLM surface ownership. In addition, BLM coordinated with other federal and state river administering agencies and consulted applicable source listings such as the NPS Nationwide Rivers Inventory and the American Rivers Outstanding Rivers List. These initial screening and identification efforts resulted in a list of 78 rivers or river segments in the decision area that required further consideration in the inventory process. Fourteen of the 78 were identified for further study. Additional reviews focused on whether these segments met the free-flowing criteria and contained any outstandingly remarkable values, as defined in the WSR Act.

Of the 14 segments, seven were determined eligible because they contained one or more outstanding or remarkable criteria, as defined by BLM Manual 8351. The seven segments that met the eligibility criteria and corresponding resource values are shown in Table 3-68 (Map 162).

**Table 3-68 Wild and Scenic Rivers and River Segments Eligibility**

| River or Creek Name | Total Segment Length Including Non-BLM Lands (miles) | Portion of Segment Occurring on BLM Lands (miles) | Free Flowing Determination | Scenic | Recreation | Geological | Fish | Wildlife | Historic | Cultural | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bad Canyon | 5 | 4.5 | Y | | | | X | | | | |
| Bear Canyon | 1.6 | 1.6 | Y | | X | | | X | | X | |
| Crooked Creek (above fish barrier) | 1.59 | 1.59 | Y | X | X | | X | | | X | |
| Crooked Creek (below fish barrier) | 1.56 | 1.56 | Y | X | X | | | | | X | |
| Gyp Springs | .46 | .46 | Y | | | | | | X | X | |
| Piney Creek | .16 | .16 | Y | | | | X | | | | |
| Yellowstone River-Pompeys Pillar | 4.46 | 4.19 | Y | | X | X | | | X | X | |

**Note:**
Source: Data extracted from Ecosystem Eligibility Report, 2009, Appendix R.

The seven waterway segments in the decision area that were identified as meeting the eligibility criteria are tentatively classified as wild, scenic, or recreational.

## 3.29.2 Suitability Phase

The purpose of the suitability phase is to determine whether eligible river segments are suitable for inclusion in the NWSRS per the WSR Act criteria. The suitability evaluation does not result in official designation; it is only a suitability determination for designation. The BLM cannot administratively designate a stream into the NWSRS through a planning or other agency decision. Only Congress or, in some instances, the Secretary of the Interior may designate a wild or scenic river segment. Water protection strategies and measures to meet the purposes of the WSR Act will be the responsibility of Congress in any legislation proposed. Rivers that do not meet suitability would be dropped from further consideration and managed according to the objectives outlined in this RMP.

The suitability phase is conducted as part of the RMP revision process and addressed in a range of alternatives.

# 3.30 Pryor Mountain Wild Horse Range (PMWHR)

See Wild Horses and Burros Section 3.9 for PMWHR information.

## 3.31 National Historic Trails

National Scenic Trails are continuous trails over 100 miles long that provide outstanding non-motorized recreation opportunities. The BLM BiFO does not manage any national scenic trails.

National Recreation Trails are regional and local trails recognized by the Secretaries of Agriculture or Interior that provide a variety of outdoor recreation uses that are accessible from urban areas. The BLM BiFO does not manage any national recreation trails.

National Historic Trails commemorate historic or pre historic travel routes that are of significance to the entire nation. A designated trail should generally follow the route of the historic trail but may deviate if necessary. To qualify for designation as a national historic trail, a trail must meet the following criteria:

- Have been established by a historic use and have historical significance as a result of that use
- Have historic use of the trail that has had a far and reaching effect on broad patterns of American culture
- Has significant potential for public recreational or historical interest.

National Historic Trails are managed in accordance with the National Trail System Act of 1968, as amended (16 USC 1241-1251) to identify and protect the historic route and its historic remnants and artifacts for public use and enjoyment.

The Bureau of Land Management guidance further provides that National Historic Trails (NHT) should be managed to promote preservation, public access, travel opportunities, enjoyment, and appreciation of National Trails for present and future generations as a component of the National Landscape Conservation System or the National Trails System.

The BiFO manages several segments of two National Historic Trails. These include segments along the Lewis and Clark National Historic Trail (L&CNHT) and the Nez Perce National Historic Trail (NPNHT) (Map 166 – National Historic Trails).

The BiFO manages approximately 12 miles of the Nez Perce (Nimíipuu or Nee-Me-Poo) National Historic Trail. The BiFO also manages the portion of trail on public land along the Clarks Fork of the Yellowstone River and north toward the Bear's Paw Mountains. The trail stretches from Wallowa Lake, Oregon, to the Bear's Paw Battlefield near Chinook, Montana. It was designated as a National Historic Trail in 1986. This route was used in its entirety only once; however, components of the route were used for generations prior to and after the 1877 flight of the Nez Perce.

The BiFO manages approximately seven miles of the L&CNHT that primarily follows the Yellowstone River through the planning area. Most public lands along the river trail are inaccessible except for 2.2 miles near Pompeys Pillar NM. The L&CNHT section adjacent to Pompeys Pillar NM is addressed in more detail in Section 3.4.2 - Pompeys Pillar of this document.

# 3.32 Social and Economic Conditions

## 3.32.1 Social Conditions

### 3.32.1.1 Attitudes and Social Trends

This section focuses on the attitudes and social trends that affect BLM land management. This information is important to land management decision makers because the trends and attitudes can affect relationships between the agency and its constituents, the ability to successfully implement plans, and the potential impacts to individuals and communities (both in the geographical sense and communities of interest.)

Changes in the management of BLM-administered lands are just one aspect of a broader debate in environmental and resource management occurring locally, nationally, and globally. Commodity, amenity, environmental quality, ecological, recreation, and spiritual are all social land and natural resource values. While the emphasis on the commodity value of public lands has been prevalent in the past, a recent study examining public attitudes toward ecosystem management in the United States found "generally favorable attitudes toward ecosystem management (defined as maintaining and ensuring sustainability) among the general public." (Bengston, Xu, and Fan 2001)

In the rural West, in places where land use has been relatively unrestricted, some individuals and groups have expressed concern regarding the control and management of BLM-administered lands. People with these concerns feel that government officials and environmental advocacy groups that do not have a true understanding of the lands or local residents who depend upon these lands for income and recreation drive changes in BLM land management. Of particular concern is the loss of current land uses such as livestock grazing and OHV use. People with these concerns seek to balance what they consider environmental extremism with economic and human concerns, and they may feel that local elected officials, with whom they are more closely in touch on a daily basis, are better equipped to make decisions about BLM-administered lands.

The Billing Field Office is located in an area where there is a significant amount of federal land ownership. In addition to BLM administered lands, the planning area counties include parts of several National Forests, the Bighorn Canyon National Recreation Area, the Little Bighorn National Monument, several small National Wildlife Refuges and Yellowstone National Park. Some members of the public do not readily differentiate between the various federal land management agencies so that activities by other federal agencies may affect the public's views of the BLM. General attitudes toward the federal government, in some cases unrelated to specific BLM activities, may also influence attitudes toward the BLM.

Some of the major trends affecting BLM's land management of the Billings Field Office area are:

1) The increasing popularity of BLM land for recreation. A comprehensive report on recreation by Cordell et al. (1999) indicates that demand in the Rocky Mountain West for

recreation activities will increase substantially by the year 2020, with non-consumptive wildlife activities, sightseeing, and visiting historic places increasing the most.

2) Concern regarding access to BLM-administered land and the loss of public access to some private land is adding pressure on BLM-administered lands. These changes, linked to the pursuit of a quality recreation experience, occur for a variety of reasons, which include the purchase of lands for private use, leases to outfitters for exclusive use, and closure of private land and roads to avoid problems of safety, fire, fences, weed, litter, and open gates.

3) An aging population is another trend occurring in the nation and Montana; in 2009, 14.6 percent of the population in the planning area was 65 or older, compared to a nationwide figure of 13.0 percent. For the state as a whole, the percentage of population 65 or older is expected to increase to about 25 percent by 2025. The percentage of people 65 or older is actually increasing more rapidly in states like Montana because young people are more likely to leave for advanced education, military service, and employment opportunities not available locally.

4) An increase in year round and vacation homes in the wildland urban interface (WUI) which has led to an increase in human caused ignitions and greater demands for resources necessary to suppress fire.

## 3.32.1.2 Population

### 3.32.1.2.1 Montana, Wyoming, and the Planning Area

The planning area includes eight counties in south central Montana and two counties contiguous to the Montana counties in north central Wyoming (Table 3-69). The Montana Counties are Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland and Yellowstone, and the Wyoming Counties are Big Horn and Park. The Wyoming Counties are included because the Billings Field Office administers over 4,000 acres in Big Horn County, Wyoming as part of the Pryor Mountain Wild Horse Range, and some economic activity related to Carbon County mineral development occurs in Park County, Wyoming.

In 2010, the Montana state population was 989,415 persons across a 145,552 square mile land area. This represented a 9.7 percent increase from 2000. Population density was an average of 6.8 persons per square mile, compared to a national figure of 87.3. In 2009, 14.6 percent of all Montana residents were 65 years and older compared to a national figure of 13.0 percent. Based on 2005-2009 data, 90 percent of persons over 25 in Montana were high school graduates compared to 85 percent for the country as a whole. In 2009, 15.0 percent of the state population had incomes below the poverty level compared to a figure of 13.8 percent nationwide.

The Montana portion of the planning area had a population of 191,118 in 2010, which was about 19 percent of the total population of the state. This figure represented an 11.6 percent increase from 2000 which was slightly higher growth than for the state as a whole. Population density was an average of 9.4 persons per square mile which was higher than for the state as a

whole. The influence of Yellowstone County, home to Billings which is the largest city in Montana, is obvious in these figures. Nearly 77 percent of the planning area population was located in Yellowstone County, population density in Yellowstone County was 56.2 compared to 0.8 to 4.9 in the other counties, and the growth rate for Yellowstone County was higher than for all the other Montana planning area counties.

In 2009, 16.3 percent of the Montana planning area population was 65 years or older compared to a Montana figure of 14.6 with the oldest populations being in the more rural counties. Based on 2005 to 2009 data, an average of 89.9 percent of persons over 25 in the planning area were high school graduates with the highest figure being in Yellowstone County. In 2009, 16.3 percent of the planning area counties had incomes below the poverty level with the level being highest in Big Horn County. The percent American Indian in 2010 was 9.0 percent with the figure being highest in Big Horn County where the Crow Reservation is located.

As mentioned previously, the largest community in the Montana part of the planning area is Billings in Yellowstone County, with a 2010 population of 104,170. There are nine other incorporated areas in the planning area with 2010 populations greater than 1,000: Lockwood 6,797 (Yellowstone County), Laurel 6,718 (Yellowstone County), Hardin 3,505 (Big Horn County), Red Lodge 2,125 (Carbon County), Columbus 1,893 (Stillwater County), Roundup 1,788 (Musselshell County), Big Timber 1,641 (Sweet Grass County), Crow Agency 1,616 (Big Horn County) and Absarokee 1150 (Stillwater County). In addition, there are numerous other incorporated and unincorporated communities in the planning area that function with independent and/or shared services including water districts, sewer districts, and school districts.

In 2010, the Wyoming state population was 563,626 persons across a 97,100 square mile land area. This represented a 14.1 percent increase from 2000. Population density was 5.8 persons per square mile, compared to a national figure of 87.3. In 2009, 12.3 percent of all Wyoming residents were 65 years and older compared to a national figure of 12.9 percent. Based on 2005-2009 data, 91.1 percent of persons over 25 in Wyoming were high school graduates compared to 84.6 percent for the country as a whole. In 2009, 10.2 percent of the state population had incomes below the poverty level compared to a figure of 14.3 percent nationwide.

The Wyoming portion of the planning area had a population of 39,971 in 2010, which was about 7 percent of the total population of the state. This figure represented a 6.8 percent decrease from 2000 which was about half the growth rate for Wyoming as a whole. In 2009, 17.2 percent of the Wyoming planning area population was 65 years or over compared to a Wyoming figure of 12.3. Based on 2005 to 2009 data, an average of 90.0 percent of persons over 25 in the planning area were high school graduates with the higher figure being in Park County. In 2009, 10.5 percent of the planning area counties had incomes below the poverty level which was slightly higher than the state figure. The percent American Indian in 2010 was 0.8 percent which was lower than the state figure of 2.4 percent.

There are five incorporated communities with a population greater than 1,000 in the Wyoming portion of the planning area. These include: Cody 9,520 (Park County), Powell 5,373 (Park County), Lovell 4,604 (Big Horn County), Greybull 1,879 (Big Horn County) and Basin 1,269 (Big Horn County). In addition there are numerous other incorporated and unincorporated communities that function with independent and/or shared services including water districts, sewer districts, and school districts. Some of the communities in both Big Horn and Park Counties are affected by mineral development occurring in the Montana Counties.

**Table 3-69 Demographic and Social Information for the Montana and Wyoming Planning Area Counties**

| Demographic and Social Information for the Montana and Wyoming Planning Area Counties | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Big Horn (MT) | Carbon (MT) | Golden Valley (MT) | Musselshell (MT) | Stillwater (MT) | Sweet Grass (MT) | Wheatland (MT) | Yellowstone (MT) | Big Horn (WY) | Park (WY) | Planning Area MT/ WY | State of MT | State of WY |
| 2010 Population | 12,865 | 10,078 | 884 | 4,538 | 9,117 | 3,561 | 2,168 | 147,972 | 11,668 | 28,205 | 191,183/ 39,971 | 989,415 | 563,626 |
| % Change 2000-2010 | 1.5 | 5.5 | -15.2 | 0.9 | 11.3 | 1.2 | -4.0 | 14.4 | 1.8 | 9.4 | 11.6/ 6.8 | 9.7 | 14.1 |
| Persons Per Sq. Mi. (2010) | 2.6 | 4.9 | 0.8 | 2.4 | 5.1 | 2.0 | 1.5 | 56.2 | 3.7 | 4.1 | 9.4/ 3.9 | 6.8 | 5.8 |
| Net Migration (2000-2009) | -1,077 | 347 | 2 | 219 | 405 | 39 | -175 | 10,026 | NA | NA | 978** | 42,980 | NA |
| % Age 65 & Over (2009) | 9.7 | 17.4 | 15.8 | 18.7 | 16.4 | 18.5 | 20.5 | 14.0 | 17.2 | 17.2 | 16.3/ 17.2 | 14.6 | 12.3 |
| % White (2010) | 31.4 | 97.2 | 94.0 | 96.1 | 96.8 | 96.6 | 95.8 | 90.7 | 94.4 | 95.6 | 87.3/ 95.0 | 89.4 | 90.7 |
| % American Indian (2010) | 64.3 | 0.8 | 1.0 | 1.3 | 0.8 | 0.4 | 0.5 | 4.0 | 0.9 | 0.6 | 9.0/ 0.8 | 6.3 | 2.4 |
| % HS Grad Persons 25 & Over (2005-2009) | 82.4 | 91.1 | 89.2 | 83.9 | 91.4 | 86.3 | 87.6 | 91.0 | 88.3 | 92.1 | 89.9/ 90.0 | 90.4 | 91.1 |
| Median Household Income (2009) | $32,223 | $41,952 | $30,424 | $33,382 | $53,637 | $41,993 | $28,730 | $47,139 | $22,675 | $47,264 | $38,685/ $34,969 | $42,222 | $54,400 |
| % Persons Below the Poverty Level (2009) | 24.0 | 12.1 | 21.7 | 20.5 | 9.3 | 11.5 | 19.5 | 11.7 | 10.6 | 10.4 | 16.3/ 10.5 | 15.0 | 10.2 |

NA indicates information not available
*Montana Planning area includes the 6 Montana Counties; Wyoming Planning area includes the 2 Wyoming Counties
**Includes only the Montana Counties
Source: 2010 Quickfacts, Bureau of the Census

### 3.32.1.2.2 Montana County Information

Big Horn County, Montana

Big Horn County, located in the southern part of the planning area, is the home of the Crow Indian Reservation (covering 64 percent of the county). The tribal headquarters are located in the county at Crow Agency. The county also contains a small part of the Northern Cheyenne Indian Reservation, part of the Bighorn Canyon National Recreation Area, and the Little Bighorn Battlefield National Monument. The U.S. Bureau of Reclamation operates a major water project, Yellowtail Dam, in the county. The county population was 12,865 in 2010, an increase of 1.5 percent since 2000. Hardin, the county seat, had a 2010 population of 3,505. Other smaller communities include Crow Agency, Lodge Grass, Busby and Fort Smith. In 2007, Big Horn County had 695 farms and ranches with 369 (53%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches increased 19 percent between 2002 and 2007 while the amount of land in farms increased by 3 percent and the average size of the farm declined by 13 percent to 4,172 acres. There are 7 acres of BLM administered surface land and 1,364 acres of BLM administered mineral estate in Big Horn County.

Carbon County, Montana

Carbon County, located in the southwestern part of the planning area, has more BLM administered surface acreage and mineral estate than any other planning area county. Located at the base of the Beartooth Mountains, it has become a tourist destination and is home to the beginning of the Beartooth All-American Road and Scenic Highway, Red Lodge ski resort, most of the Bighorn Canyon National Recreation Area and part of the Pryor Mountain Wild Horse Range. The county population was 10,078 in 2010, an increase of 5.5 percent since 2000. Red Lodge, the county seat, had a population of 2,125 in 2010. Other smaller communities include Belfry, Bridger, Fromberg and Joliet. In 2007, Carbon County had 715 farms and ranches with 335 (47%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches increased 2 percent between 2002 and 2007 while the amount of land in farms increased by 5 percent and the average size of the farm increased by 4 percent to 1,110 acres. There are 220,384 acres of BLM administered surface land and 356,418 acres of BLM administered mineral estate in Carbon County. Activities on BLM administered lands include oil & gas leasing and production, bentonite production, recreation use, livestock grazing and rights-of-way.

Golden Valley County, Montana

Golden Valley is located in the north central part of the planning area. It is bordered by the Big Snowy Mountains to the north, and the Musselshell River runs through the center of the county. Golden Valley County is the least densely settled county in the planning area and lost the most population (proportionately) in the prior decade. The county population was 884 in 2010, a decrease of 15 percent since 2000. Ryegate, the county seat, had a population of 214 in 2010. In 2007, Golden Valley County had 153 farms and ranches with 96 (63%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches increased 9 percent between 2002 and 2007 while the amount of land in farms

increased by 2 percent and the average size of the farm declined by 7 percent to 4,391 acres. There are 7,939 acres of BLM administered surface land and 68,209 acres of BLM administered mineral estate in Golden Valley County. Activities on BLM administered lands include oil & gas leasing and production, recreation use, and livestock grazing.

Musselshell County, Montana

Musselshell County, which has an active underground coal mine in the Bull Mountains, is located in the northeastern part of the planning area. It has the second most BLM administered surface acreage and mineral estate of any county in the planning area. The county population was 4,538 in 2010, an increase of 1 percent since 2000. Roundup, the county seat, had a population of 1,788 in 2010. In 2007, Musselshell County had 373 farms and ranches with 190 (51%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches increased 10 percent between 2002 and 2007 while the amount of land in farms increased by 17 percent and the average size of the farm declined by 6 percent to 3,038 acres. There are 101,239 acres of BLM administered surface land and 251,690 acres of BLM administered mineral estate in Musselshell County. Activities on BLM administered lands include oil & gas leasing and production, recreation use, coal mining, timber production and livestock grazing.

Stillwater County, Montana

Stillwater County is located in the southwestern part of the planning area and is home to the Stillwater Mine, currently the only operating platinum/ palladium mine in the United States. The county population was 9,117 in 2010, an increase of 11.3 percent since 2000. Columbus, the county seat, had a population of 1,893 in 2010. Other smaller communities include Absarokee, Park City, Reed Point and Rapelje. In 2007, Stillwater County had 635 farms and ranches with 290 (46%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches increased 15 percent between 2002 and 2007 while the amount of land in farms decreased by 4 percent and the average size of the farm decreased by 16 percent to 1,350 acres. There are 5,504 acres of BLM administered surface land and 61,418 acres of BLM administered mineral estate in Stillwater County. Activities on BLM administered lands include oil & gas leasing and production, timber production, recreation use, livestock grazing and rights-of-way.

Sweet Grass County, Montana

Sweet Grass County is located in the western part of the planning area and is surrounded by the Absaroka, Beartooth, and Crazy mountains. The county population was 3,561 in 2010, an increase of 1.2 percent since 2000. Big Timber, the county seat, had a population of 1,641 in 2010. In 2007, Sweet Grass County had 355 farms and ranches with 177 (50%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches decreased 1 percent between 2002 and 2007 while the amount of land in farms decreased by 6 percent and the average size of the farm decreased by 6 percent to 2,289 acres. There are 15,893 acres of BLM administered surface land and 32,053 acres of BLM administered mineral estate in Stillwater County. Activities on BLM administered lands include oil & gas leasing and production, timber production, recreation use, livestock grazing and rights-of-way.

Wheatland County, Montana
Wheatland County is located in the northwest part of the planning area and is home to new wind farm development. Wheatland County is the second least densely settled county in the planning area and lost the second most population (proportionately) in the prior decade. The county population was 2,168 in 2010, a decrease of 4 percent since 2000. Harlowton, the county seat, had a population of 997 in 2010. In 2007, Wheatland County had 137 farms and ranches with 75 (55%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches declined 16percent between 2002 and 2007 while the amount of land in farms declined by 2 percent and the average size of the farm increased by 16 percent to 6,002 acres. There are 1,330 acres of BLM administered surface land and 85,370 acres of BLM administered mineral estate in Wheatland County. Activities on BLM administered lands include livestock grazing.

Yellowstone County, Montana
Yellowstone County is located in the central part of the planning area and is the major trade and service center for south central Montana and north central Wyoming. It is by far the most densely settled county in the planning area. The county population was 147,972 in 2010, an increase of 14.4 percent since 2000. Billings, the county seat, had a population of 104,170 in 2010. In 2007, Yellowstone County had 1,407 farms and ranches with 538 (38%) of the principal operators identifying farming and ranching as their primary occupation. The number of farms and ranches increased 10 percent between 2002 and 2007 while the amount of land in farms increased by 3 percent and the average size of the farm declined by 6 percent to 1,148 acres. There are 77,375 acres of BLM administered surface land and 122,461 acres of BLM administered mineral estate in Yellowstone County. Activities on BLM administered lands include oil & gas leasing and production, recreation use, livestock grazing and rights-of-way.

### 3.32.1.2.3 Wyoming County Information

Big Horn County, Wyoming
Big Horn County, Wyoming, is located along the Montana-Wyoming border directly south of Carbon and Big Horn Counties, Montana. It is home to part of the Pryor Mountain Wild Horse Range (PMWHR), the Pryor Mountain Wild Mustang Center (PMWMC) and part of the Bighorn Canyon National Recreation Area. The county population was 11,668 in 2010, an increase of 1.8 since 2000. Basin, the county seat, had a population of 1,269 in 2010. Lovell, with a 2010 population of 4,604, is the largest community in Big Horn County and the location of the PMWMC. There are 4,303 acres of BLM administered surface land and mineral estate in Big Horn County. Activities on BLM administered lands include livestock grazing and recreation on the PMWHR. In addition, some communities in this county are affected by mineral development on BLM administered land in the adjacent Montana counties.

Park County, Wyoming
Park County, Wyoming, is located directly south of Carbon County, Montana.

The county population was 28,205 in 2010, an increase of 9.4 percent since 2000. Cody, the county seat with a 2010 population of 9,520, is a gateway community to Yellowstone Park which comprises a large part of the county. There are no acres of Billings RMP administered surface or subsurface land in this county. However, some communities are affected by mineral development on BLM administered land in the adjacent Montana counties.

### 3.32.1.3 Potentially Affected Groups and Individuals

Discussions of potentially affected groups and individuals in the BiFO planning area are included to facilitate an assessment of social effects that may occur. The groups listed below are residents, recreationists, or others who have direct relationships to management of BLM lands:

- Ranchers/ livestock permittees
- Recreationists (participants in motorized and-motorized activities)
- Groups and individuals who prioritize resource protection
- Groups and individuals who prioritize resource use
- Wild horse advocates
- American Indian tribes

These groups are not mutually exclusive, and examples of households that fit into more than one category are likely.

In many cases, social effects are described in terms of quality of life, which could include the quantity and quality of available resources (recreation opportunities) and resolution of problems related to resource activities. Other less tangible beliefs that may affect quality of life include: individuals having a sense of control over the decisions that affect their future and individuals feeling that the government strives to act in ways that consider all stakeholders' needs.

#### 3.32.1.3.1 Ranchers/Livestock Grazing Permittees

Ranching is an important part of the history, culture, and economy of the study area. In 2007, there were almost 4,500 farms and ranches in the Montana part of the planning area. Many livestock operators in the planning area graze livestock on public lands (both BLM and National Forest lands). Ranchers face many challenges today that include changes in federal regulations, economic issues, aging ranching populations and changing land use. Ranchers and grazing permittees may face increasingly stressful social situations as they try to balance their traditional lifestyles with demands from government agencies and other public land users such as recreationists. In addition, the absentee ownership of base property associated with the allotments has increased, as has the number of permittees that do not rely on livestock grazing for their primary source of income. Some permittees have shifted the focus of their management to wildlife habitat improvement and recreation. Others have diversified their income by seeking supplemental work off the ranch, providing outfitting and guest ranch services, and/or diversifying their output. These changes in the types of permittees that run livestock have resulted in the diversification of perspectives among the permittees.

Ranchers and livestock grazing permittees in the planning area offered the following comments/concerns during scoping: maintain motorized access to administer allotments, maintain availability of forage and AUMs, range condition, a desire to purchase BLM inholdings within ranches, concern with public use of leased areas, and trespass across private ground to access public lands.

#### 3.32.1.3.2 Recreationists

Outdoor recreation is a component of most lifestyles in the planning area. According to University of Montana research, Montanans take more leisure trips than the United States average (MFWP 2008). The substantial recreational opportunities for fishing, hunting, hiking, horseback riding, OHV use, and sightseeing are important elements of the overall quality of life for planning area residents. Recreationists represent very diverse groups of people, and changes in recreation management can affect people who engage in the various activities differently based on need and preference. Due to the diversity of recreation activities, recreationists tend to organize into interest groups. Examples of these would be hunters, OHV users, horse riders, etc. Most recreational activities have at least one organization that advocates for their particular activity. The Montana Statewide Comprehensive Outdoor Recreation Plan outlined key issues based on statewide surveys and other research (MFWP 2008). The following are some of the key issues relevant to BLM-administered lands in the planning area:

- a need for continued access to, and maintenance of, rural and backcountry trails and use areas for hiking, biking, skiing, equine and motorized (OHV, snowmobile) recreation;
- a need for increased miles and maintenance of urban and rural trails and access for water-based recreation.; and
- insufficient quality and quantity of recreation facilities for youth.

Outfitters and guides use recreational opportunities in the planning area for economic gain. Some outfitters and guides are ranchers or farmers who use recreation as a means to achieve economic diversification. Others operate full-time or seasonal outfitter businesses and employ some local residents as guides, while still others are permanent full-time guides who have their own local and non-local clients.

Comments from recreationists during scoping included: more access for preferred activities including horseback riding, mountain biking, and winter activities, increased hunting opportunities, signing to identify public lands, education of users, adequate law enforcement, address user conflicts, and place high value on open places and scenery. Motorized recreationists wanted motorized opportunities to be maintained, improved trails, loop trails, and volunteer opportunities. Non-motorized recreationists wanted solitude and tranquility and were concerned about illegally created roads and resource damage from motorized use.

#### 3.32.1.3.3 Groups and Individuals Who Give a High Priority to Resource Protection

Various individuals and groups at the local, regional, and national levels are interested in the ways BLM manages public lands. Many of these concerns regard wildlife and wildlife habitat, special status plant species and habitat, water quality, and visual quality. They value BLM-administered land for wildlife, recreation, education, scenic qualities, wilderness, and open space, among other reasons. Their concerns include preserving healthy ecosystem and plant communities, protection of rare plant species, need for designating more ACECs, and the effects of oil and gas development, wind energy, residential development on adjacent lands and motorized access.

#### 3.32.1.3.4 Groups and Individuals Who Give a High Priority to Resource Use

Many individuals and groups are concerned about limitations on the availability of public lands for commercial uses, such as livestock grazing and mineral or energy development. They indicate that the public lands have to be managed to be as productive as possible and the survival of local economies and local communities depend upon these industries. Some of the comments received during scoping indicated concerns about stipulations, restriction and delays on oil and gas development, support for wind energy development and timber harvest, and a desire for reasonable access.

#### 3.32.1.3.5 Small Communities

Small communities can be tied to BLM and public lands in a variety of ways. Local businesses and governments depend upon BLM employees to support businesses and public services, while use of public lands for recreation activities, livestock grazing, minerals or energy development, and other activities can provide economic and leisure-time opportunities. Area residents are concerned about young people and families leaving the area to seek employment elsewhere, declining farm populations, local business closings, and lack of funds for public services resulting from the declining tax base.

Comments received during scoping include: want to see new economic opportunities for jobs, tax revenue for schools, services and infrastructure, concern about increasing residential development, concerns with non-locals overriding local interests, and private property rights on lands adjacent to public lands.

#### 3.32.1.3.6 Wild Horse Advocates

Various individuals and groups at the local, regional and national level are very interested in the welfare of the wild horses on the Pryor Mountain Wild Horse Range. A visitor center, the Pryor Mountain Wild Mustang Center is located in Lovell, Wyoming, and the herd and range are an important part of that community's identity. Comments received during scoping included: want to see the wild horses and their areas left alone, people from all over the world and all walks of live come to see the horses---and spend their money, promote the use of land so the herd can sustain larger numbers, end roundups, work with NPS and USFS to expand the range, and provide responsible viewing opportunities for the public.

### 3.32.1.3.7 American Indian Tribes

Two Reservations are located in the vicinity of the Billings RMP planning area: the Crow Reservation in Big Horn County, and the Northern Cheyenne Reservation that is located directly to the east of the Crow Reservation in Rosebud County. Other federally recognized tribes in and adjacent to Montana with an interest in the planning area include:

- Fort Peck Indian Reservation, Montana (Assiniboine and Sioux Tribes)
- Blackfeet Indian Reservation, Montana (Blackfeet Tribe)
- Rocky Boy's Indian Reservation, Montana, (Chippewa-Cree Tribe)
- Fort Belknap Reservation, Montana (Fort Belknap Indian Community)
- Wind River Reservation, Wyoming (Eastern Shoshone and Arapaho Tribes)
- Cheyenne River Indian Reservation, South Dakota (Cheyenne River Sioux Tribe)
- Rosebud Indian Reservation, South Dakota (Rosebud Sioux Tribe)
- Pine Ridge Indian Reservation, South Dakota (Ogalala Sioux Tribe)
- Fort Berthold Indian Reservation, North Dakota (Three Affiliated Tribes)
- Turtle Mountain Indian Reservation, North Dakota (Turtle Mountain Band of Chippewa)
- Spirit Lake Indian Reservation, North Dakota (Spirit Lake Sioux Tribe)
- Standing Rock Indian Reservation, North Dakota & South Dakota (Standing Rock Sioux Tribe)
- Fort Hall Indian Reservation, Idaho (Shoshone-Bannock Tribes)

American Indian traditionalists have maintained connections to places containing edible and medicinal plants, rock art, grave sites, and places used for tree platform "burials," mineral and plant products used in rituals or for paints, and vision quest stations. They are also interested in visiting the sites of battles, old trading posts, and ghost towns to learn more about these aspects of their history. Currently, through a project led by Big Horn Canyon National Recreation Area in cooperation with the Northern Cheyenne and Crow tribal colleges, young American Indians are participating in archeological excavation as a means of maintaining connections to their tribal history and acquiring marketable skills.

Concerns received during scoping included protection for: edible and medicinal plants, rock art sites, grave sites, mineral and plant products used in rituals or for paints, and vision quest sites.

### 3.32.1.3.8 Indian Trust Resources

Indian Trust Resources are legal interests in assets held in trust by the federal government for federally recognized Indian tribes or nations or for individual Indians. These assets may be real property, physical assets, or intangible property rights. Examples include land, minerals, water rights, hunting and fishing rights, other natural resources, money, or claims. Federal laws and guidance that may apply to Indian Trust Resources in the conditions of the RMP include, but

are not limited to, the American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Indian Sacred Sites, and Secretarial Order 3206. Indian Trust Resources located on the Crow and Northern Cheyenne Indian Reservations are managed and protected by the tribes. Indian Trust Resources located on lands administered by the BLM are managed and protected by the BLM; however, no Indian Trust Resources have been identified on BLM administered lands in the planning area. However, the Montana/Dakotas BLM currently holds ownership of a number of water rights held in trust for the Crow Tribe. The BLM acquired these trust resources as a result of land exchanges that occurred under the Crow Boundary Settlement Act. The water rights are currently located on lands owned by the Crow Tribe.

### 3.32.1.3.9 Tribal Treaty Rights

Laws, Regulations, and Policies

BLM coordination or consultation with Native Americans, as it pertains to treaty rights and trust responsibility, is conducted in accordance with the following direction:

- Bureau Handbook H-8120-1 – General Procedural Guidance for Native American Consultation (December 3, 2004). Executive Order No. 13084 – Consultation and Coordination with Indian Tribal Governments, May 14, 1998.
- Government-to-Government Relations with Native American Tribal Governments (Memorandum signed by President Clinton; April 29, 1994).
- Order No. 3175 – Departmental Responsibilities for Indian Trust Resources (Section 2 of Reorganization Plan No. 3 of 1950 – 64 Stat. 1262; November 8, 1993).

Treaties are negotiated contracts made pursuant to the Constitution of the United States and are considered the "supreme law of the land." They take precedence over any conflicting state laws because of the supremacy clause of the Constitution (Article 6, Clause 2). Treaty rights are not gifts or grants from the United States, but are bargained-for concessions. These rights are grants-of-rights from the tribes, rather than to the tribes. The reciprocal obligations assumed by the Federal government and Indian tribes constitute the chief source of present-day Federal Indian law.

The federal government has a unique and distinctive political relationship with federally recognized Indian tribes. It is defined by treaties, statutes, executive orders, judicial decisions and agreements and differs from relationships with state and local governments or other entities. It has given rise to a special federal trust responsibility, involving the legal responsibilities and obligations of the United States toward Indian tribes and the application of fiduciary standards of due care with respect to Indian lands, tribal trust resources and the exercise of tribal rights.

The United States and represented agencies, including the BLM, have a special trust relationship with Indian tribes because of these treaties. As a Federal land managing agency, the BLM has the responsibility to identify and consider potential impacts of BLM plans, projects, programs, or activities on Indian trust resources (e.g., fish, game, and plant resources–

see **Glossary**). When planning any proposed project or action, the BLM must ensure that all anticipated effects on Indian trust resources are addressed in the planning, decision, and operational documents prepared for each project. The BLM also has the responsibility to ensure that meaningful consultation and coordination concerning tribal treaty rights and trust resources are conducted on a government-to-government basis with federally recognized tribes.

Native American Indians inhabited north-central Montana, including the lands now managed by the Billings Field Office, for thousands of years prior to European contact. They hunted, fished, gathered plant foods, buried their dead, and conducted religious ceremonies on lands within the planning area since time immemorial. The lands managed by the Billings Field Office are within the historical use area/aboriginal territories of the Crow Tribe of the Crow Reservation, the Northern Cheyenne Tribe of the Northern Cheyenne Reservation, the Eastern Shoshone of the Wind River Reservation in Wyoming, and the Shoshone-Bannock of the Ft. Hall Reservation in Idaho. All tribes continue to express interest in and concern over, public lands and cultural/natural resources within the planning area.

During the 1850s and 1860s, treaties were negotiated with the tribes in the northwestern United States in order to acquire Indian lands for homesteading. The settlement of the northwestern United States by non-Indians led to the collapse of the Tribal Nations as they were previously known, including their economic, social, cultural, religious, and governmental systems.

Examples of these treaties include the *Treaty of Ft. Laramie with Sioux, etc., 1851*. On September 17, 1851 a treaty was signed at Ft. Laramie, Indian Territory, between the United States and many of the Plains Indian Tribes including the Sioux, Cheyenne, Arapaho, Crow, Assiniboine, Gros Ventre, Mandan, and Arikara. Article 2 of the treaty states, "The aforesaid nations do hereby recognize the right of the United States Government to establish roads, military and other posts, within their respective territories". Article 5 of the treaty delineated the boundaries of established "territories" for each of the tribes, and further stated, "It is, however, understood that, in making this recognition and acknowledgement, the aforesaid Indian nations do not hereby abandon or prejudice any rights or claims they may have to other lands; and further, that they do not surrender the privilege of hunting, fishing, or passing over any of the tracts of country heretofore described."

Subsequent treaties established formal reservations. On May 7, 1868, at Ft. Laramie, Dakota Territory, the Crow Tribe and the United States signed the *Treaty with the Crows, 1868.* In accordance with the treaty, the tribe relinquished ownership to millions of acres of land in Montana and Wyoming territories to the United States, and was guaranteed a permanent homeland which has become known as the Crow Reservation in south central Montana. Article 4 of the treaty also states, "The Indians herein named agree, when the agency-house and other buildings shall be constructed on the reservation named, they will make said reservation their permanent home, and they will make no permanent settlement elsewhere, but they shall have the right to hunt on the unoccupied lands of the United States so long as game may be found thereon, and as long as peace subsists among the whites and Indians on the borders of the hunting districts."

On May 10, 1868, at Ft. Laramie, Dakota Territory, the Northern Cheyenne and Northern Arapaho tribes and the United States signed the *Treaty with the Northern Cheyenne and Northern Arapaho, 1868.* In accordance with the treaty the tribes relinquished ownership to millions of acres of land, and was guaranteed a permanent homeland, "And they do solemnly agree that they will not build any permanent homes outside of said reservations, and that within one year from this date they will attach themselves permanently either to the agency provided for near the mouth of Medicine Lodge Creek, or to the agency about to be established on the Missouri River, near Fort Randall, or to the Crow agency near Otter Creek, on the Yellowstone River, . . . . . and it is hereby expressly understood that one portion of said Indians may attach themselves to one of the afore-mentioned reservations, and another portion to another of said reservations, as each part or portion of said Indians may elect." Article 2 of the treaty also states, "And the Northern Cheyenne and Arapaho Indians do hereby relinquish, release, and surrender to the United States, all right, claim, and interest in and to all territory outside the two reservations above mentioned, except the right to roam and hunt while game shall be found in sufficient quantities to justify the chase."

On July 3, 1868, the Eastern Band Shoshone and Bannock Tribes and the United States signed the *Treaty with the Eastern Band Shoshoni and Bannock, 1868*, commonly known as the Fort Bridger Treaty (15 Stat. 673). In the Fort Bridger Treaty, the Tribes relinquished ownership of approximately 20 million acres to the United States, and were guaranteed a permanent homeland, which has become known as the Fort Hall Indian Reservation in southeastern Idaho. Article 4 of the treaty also retains the Tribes' rights to hunt, fish, and gather natural resources, and provides other associative rights necessary to effectuate these rights on the unoccupied lands of the United States.

Since the BLM manages portions of the "unoccupied lands" that are within the traditional use areas of these tribes, the BLM has a trust responsibility to provide the conditions necessary for Indian tribal members to exercise their treaty rights. Treaty rights in the planning area are extended not only to the tribes within and adjacent to the planning area, but also to other federally recognized tribes, which may have treaty language that extends their rights to lands in this area.

Members of the Crow, the Northern Cheyenne, the Eastern Shoshone, the Shoshone-Bannock Tribes, and other Federally or state recognized tribes exercise their hunting, fishing, and gathering rights on state and Federal lands outside the boundaries of their reservations. Currently, Native American tribes are not dependent on commodity resources from lands managed by the Billings Field Office for their economic livelihood. However, they do rely on BLM public lands resources for subsistence and cultural purposes. Tribal treaty rights pursued on public lands within the Billings Field Office include fishing for resident game fish species, hunting both large and small game, and gathering various natural resources for both subsistence and medicinal purposes. Currently, there is little specific information available on the exact species sought or locations used by Native Americans exercising their treaty rights within the boundaries of the planning area. Areas and natural features within the planning area may also be used for ceremonial/religious purposes in accordance with the American Indian Religious

Freedom Act. However to date, there have been no areas or resources formally identified as Traditional Cultural Properties (TCPs).

### 3.32.1.3.10 Environmental Justice

Executive Order 12898, Federal Action to Address Environmental Justice in Minority Populations and Low Income Populations, requires identifying and addressing disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities on minority and low-income populations (Table 3-70).

American Indians represent 9 percent of the population in the Montana portion of the planning area. This population is concentrated in Big Horn County, where the Crow Reservation is located. In 2009, 33 percent of the persons living on the Crow Reservation had incomes below the poverty level, compared to a statewide figure of 15.0.

In 2009, an average of 16.3 percent of the people living in the Montana portion of the planning area had incomes below the poverty level. These figures ranged from a low of 9.3 in Stillwater County to a high of 24 percent in Big Horn County.

American Indians represent less than 1 percent of the population in the Wyoming portion of the planning area, compared to a statewide figure of 2.4. In 2009, an average of 10.5 percent of the people living in the Wyoming portion of the planning area had incomes below the poverty level; this is the same figure as the state as a whole.

**Table 3-70 Environmental Justice Information for the Planning Area by County**

| State/County | % White (2010) | % American Indian (2010) | % Persons Below the Poverty Level (2009) |
|---|---|---|---|
| Big Horn | 31.4 | 64.3 | 24.0 |
| Carbon | 97.2 | 0.8 | 12.1 |
| Golden Valley | 94.0 | 1.0 | 21.7 |
| Musselshell | 96.1 | 1.3 | 20.5 |
| Stillwater | 96.8 | 0.8 | 9.3 |
| Sweet Grass | 96.6 | 0.4 | 11.5 |
| Wheatland | 95.8 | 0.5 | 19.5 |
| Yellowstone | 90.7 | 4.0 | 11.7 |
| **State /Planning Area Average** | 89.4/ 87.3 | 6.3/ 9.0 | 15.0/ 16.3 |
| Park | 95.6 | 0.6 | 10.4 |
| Big Horn | 94.4 | 0.9 | 10.6 |
| **State /Planning Area Average** | 90.7/ 95.0 | 2.4/ 0.8 | 10.2/ 10.5 |

Source: 2010 Quickfacts, Bureau of the Census

## 3.32.2 Economic Conditions

The area of local economic influence consists of eight counties in south central Montana (Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland, and Yellowstone) and two counties (Big Horn and Park) in north central Wyoming. The ten-county area of economic influence in Montana is referred to as the "local economy."

BLM-administered lands consist of approximately 434,000 surface and 979,000 subsurface acres for which the BLM makes land use decisions covered by this RMP. A majority of the BLM-administered surface lands and minerals, as well as related land uses, are located in Carbon and Musselshell Counties. BLM administered lands within the Planning Area accounts for approximately four percent of the total land area, and BLM-managed mineral estate accounts for about eight percent of the mineral estate within the planning area boundaries. Table 3-71 and the Land and Realty section of this chapter provide a detailed assessment of land and mineral ownership in the planning area by county.

During the last century, ranching, farming, mining, oil and gas development, transportation, and the emergence of Billings as a regional trade and service centers have all been important factors in the local social and economic history of the area. Billings, near the center of the Planning Area is the largest population, business, and service center in the planning area and the state. Two major travel corridors, I-90 and I-94, converge in Billings, which also has the largest airport, medical center, business, and shopping hub in the state and region.

### 3.32.2.1 Demographic and Economic Characteristics and Trends

The following section provides a summary of demographic and economic indicators that could be affected by BLM management actions. Potential economic effects associated with the proposed RMP revision include anticipated changes in employment, income, public revenues, economic dependency, and economic stability. The information in this section is presented to help clarify economic issues, describe relevant economic trends, and to provide context for potential economic impacts.

The area of local economic influence had an estimated total population of about 229,819 in 2010. County populations range from 1,072 in Golden Valley County to 146,576 in Yellowstone County (IMPLAN, 2010). Billing's population is over 100,000. Other smaller population centers include Laurel (population 6,300), Hardin (population 3,400), Red Lodge (population 2,300), Columbus (population 1,900), Roundup (population 1,900), Big Timber (population 1,700), and Harlowton (population 1,000). The local economies of Big Horn County, Wyoming (population 11,740) and Park County, Wyoming (population 28,364) may also be influenced by BLM land/mineral management decisions in the planning area. Population centers in these two counties include Cody (population 8,800), Powell (population 5,400), and Lovell (population 2,400).

Montana is one of the least densely populated states in the country, with an average population density of less than seven persons per square mile, compared to a national average of about 80 persons per square mile. The area of local economic influence had an average population density of 8.2 persons per square mile, with county population densities ranging from less than

one person per square mile in Golden Valley County to about 55 per square mile in Yellowstone County. Table 3-72 displays selected economic and demographic statistics. In 2010, there were an estimated 1.5 people per job and 0.60 households per job.

The Planning Area covers about 12 percent of Montana's land area; contains 19 percent of the state's population, 19 percent of the state's employment, and 24 percent of the state's personal income. About 70 percent of the state's industries are in the planning area's economy. Golden Valley County has the fewest industries and is the least diverse, while Yellowstone County has the most industries and is the most diverse (IMPLAN, 2010).

**Table 3-71 BLM Surface and Mineral Estate and Major BLM Land/Mineral Uses by County within the Billings RMP Planning Area**

| County | BLM Public Lands (surface) | BLM Percent of Total Surface | BLM- Federal Mineral Estate | BLM Percent of Total Mineral Estate | Major Population Center(s) and BLM Land/Mineral Uses |
|---|---|---|---|---|---|
| Big Horn, MT | 7 | 0% | 1,364 | 0% | Hardin |
| Big Horn, WY | 4,304 | NA | 4,304 | NA | Recreation, livestock grazing |
| Carbon Co. | 220,384 | 13% | 356,418 | 21% | Red Lodge, oil/gas leasing and production, bentonite production, recreation use, livestock grazing, rights-of-way |
| Golden Valley | 7,939 | 1% | 68,209 | 8% | Livestock grazing, oil/gas leasing and production, recreation |
| Musselshell | 101,239 | 7% | 251,690 | 17% | Roundup, recreation use, coal mining, oil/gas leasing and production, livestock grazing, timber |
| Stillwater | 5,504 | 0% | 61,418 | 5% | Columbus, recreation, oil and gas leasing and production, timber, rights-of-way, livestock grazing |
| Sweet Grass | 15,893 | 1% | 32,053 | 3% | Big Timber, , recreation, oil and gas leasing and production, timber, rights-of-way, livestock grazing |
| Wheatland | 1,330 | 0% | 85,370 | 9% | Harlowton |
| Yellowstone | 77,375 | 4% | 122,461 | 7% | Billings, Laurel, recreation use, livestock grazing, rights-of-way, oil and gas leasing |
| Park, WY | NA | NA | NA | NA | Cody, Powell |
| Planning Area | 433,975 | 4% | 978,983 | 8% | Billings, Laurel, Cody, Powell, Red Lodge, Columbus, Hardin, and Round Up, oil/gas leasing and production, bentonite production, recreation use, livestock grazing, rights-of-way |

**Note:**
Source: BLM Annual Report (2008)

**Table 3-72 Selected Economic and Demographic Statistics**

| County | Population | Employment | Households | Area (Sq. Miles) | Population Density | Number of Industries/ Sectors | Average Household Income | Total Personal Income (millions) |
|---|---|---|---|---|---|---|---|---|
| Montana | 980,152 | 629,236 | 387,319 | 145,556 | 6.7 | 334 | $90,218 | $34,943 |
| 10-County Area | 229,819 | 151,573 | 90,950 | 27,874 | 8.2 | 254 | $97,501 | $8,868 |
| Big Horn, MT | 13,229 | 6,496 | 4,055 | 4,995 | 2.6 | 115 | $78,803 | $320 |
| Carbon Co. | 9,763 | 5,324 | 4,129 | 2,048 | 4.8 | 141 | $85,576 | $353 |
| Golden Valley | 1,072 | 500 | 368 | 1,175 | 0.9 | 54 | $79,146 | $29 |
| Musselshell | 4,636 | 2,288 | 1,910 | 1,867 | 2.5 | 110 | $75,016 | $143 |
| Stillwater | 8,856 | 4,974 | 3,444 | 1,795 | 4.9 | 126 | $96,039 | $331 |
| Sweet Grass | 3,550 | 2,387 | 1,443 | 1,855 | 1.9 | 114 | $66,980 | $97 |
| Wheatland | 2,033 | 989 | 746 | 1,423 | 1.4 | 79 | $78,161 | $58 |
| Yellowstone | 146,576 | 102,338 | 58,652 | 2,635 | 55.6 | 218 | $99,772 | $5,852 |
| Big Horn, WY | 11,740 | 6,642 | 4,541 | 3,137 | 3.7 | 129 | $82,846 | $376 |
| Park, WY | 28,364 | 19,635 | 11,663 | 6,943 | 4.1 | 165 | $112,213 | $1,309 |

**Note:**
Source: IMPLAN (2010)

### 3.32.2.2 BLM Land and Mineral Uses that Affect the Local Economy

Local economic activity and desired economic conditions are influenced by BLM land use decisions and associated land uses. Surface and mineral estate and major BLM land/mineral uses by county are displayed in Table 3-71. The following narrative description summarizes major BLM land and mineral uses within the planning area.

#### 3.32.2.2.1 Livestock Grazing and Production

Ranching is an important part of the history, culture, and economy of the Planning Area. Grazing is allowed on BLM lands for the purpose of fostering economic development for private ranchers and ranching communities by providing ranchers access to additional forage (GAO, Sept. 2005). Livestock grazing on BLM lands is authorized on an annual basis. Authorized (actual) use of AUMs varies from year to year due to factors such as drought, wildfire, financial limitations on operators, grazing transfers, and implementation of grazing management to improve range conditions.

Between 1999 and 2009, authorized grazing use averaged 42,931 Animal Unit Months (AUMs) per year. BLM currently issues grazing permits and leases to about 310 livestock operators in the planning area. These operators use about 380 allotments and total preference is 54,980 AUMs annually. The 310 BLM livestock operators are less than 10 percent of the 4,470 farm/ranch units in the Planning Area (Census of Agriculture, 2007). Livestock grazing on BLM lands involves livestock operators who have Section 3 grazing permits (i.e., grazing on public lands within grazing districts, BLM Manual 1373.12) and Section 15 grazing leases (grazing on public lands outside the original grazing district boundaries). On public domain lands, 50 percent of revenues from Section 15 grazing fees on public domain lands are distributed to the state/counties; 12.5 percent of grazing fees from Section 3 permits are distributed to the state/counties. On lands acquired under the Bankhead Jones Land Utilization Act (LU lands), 25 percent of grazing revenues are distributed to the counties. Approximately 74 percent of the public lands administered by the BLM are public domain lands; 24 percent are acquired lands administered under the Bankhead Jones Land Utilization Act. Annual revenues to the federal government average about $62,000 given a BLM grazing fee of $1.35 per AUM plus 6.5 percent for late fees, surcharge, transfer fees etc.; annual payments to the counties would average about $10,000. Average annual authorized livestock grazing between 1999 and 2009 is shown in Table 3-73.

**Table 3-73 Average Annual Authorized Livestock Grazing Use (AUMs), Billing Years 1999-2009**

| | Section 3* | Section 15** | Total | Cattle/Horses | Sheep/Goats |
|---|---|---|---|---|---|
| 11-Year Average | 38,334 | 4,597 | 42,931 | 42,771 | 160 |

**Note:**

Source: Range Administration System, 2010

* Section 3 of the Taylor Grazing Act concerns grazing *permits* issued on public lands *within* the grazing districts established under the Act.

** Section 15 of the Taylor Grazing Act concerns issuing grazing *leases* on public lands *outside* the original grazing district boundaries.

BLM contributes about one percent of the total livestock forage needs in the planning area. BLM's forage contribution is greatest in Musselshell, Carbon, and Yellowstone counties; however, in none of these counties does the BLM contribution exceed five percent of total forage needs.

Cattle are the most prevalent class of livestock that graze on BLM land, although sheep, horses, and burros are authorized to graze in 10 allotments. Livestock operations are primarily cow/calf operations. Most calves are born in late winter through spring on private lands. Cattle are turned out to graze as cow/calf pairs. Calves have historically been weaned in the fall or early winter and most leave the region to be grown out and/or fed in other parts of the US. At weaning, most cows have been taken to winter pasture where they remain until they calve the following year. An estimated 83 percent of total cattle and calves inventory within the planning area are marketed each year (2007 Census of Agriculture).

Roughly 70 percent of all agricultural products marketed are livestock related and the BLM provides less than one percent of the total forage requirements for the livestock inventory within the planning area. By assuming a direct relationship between the percent of agricultural products that are livestock-related and the percent of agricultural related employment that is associated with livestock production, it is estimated that BLM livestock grazing contributes about 30direct and about 50 total jobs to the local economy. This estimate does not include the contribution of family labor which may be as much as 38 percent of the total direct labor contribution to livestock operations (David Taylor, University of Wyoming, 2010). It is estimated that about $935,000 in total wage and proprietor's income is related to BLM livestock grazing within the planning area (IMPLAN 2010).

BLM's grazing fee is established by formula and is generally lower than fees charged by the other agencies or private ranchers who set fees to obtain the market value of forage. The BLM grazing fee formula incorporates rancher's ability to pay and does not recover agency expenditures or capture fair market value of forage.

Livestock operations in the planning area often involve large tracts of land and ranchers depend on a mix of private and federal lands to graze cattle seasonally. None are wholly dependent on forage coming from public lands.

To qualify for a BLM grazing permit/lease, an operator must be able to accommodate his/her livestock for a specified period of time on private land owned or controlled (base property) apart from the public land (43 CFR 4110). It is rare for dependence on public land forage to exceed 50 percent, and many operators depend on public lands for less than 20 percent of their total forage needs. However, operations may depend heavily on forage from public lands during a specific season (operators graze public land in the spring through fall for five to seven months and winter their livestock on base property).

BLM grazing permits are valuable to livestock producers because the grazing fees are very favorable, and land is often available when private hay meadows is being grown to provide forage for the winter. The BLM grazing fee of $1.35 is considerably lower than the private statewide average of $18.40 per AUM (USDA, National Agricultural Statistics Service, 2010).

Access to BLM grazing may be important to area livestock producers even though additional management costs are usually incurred to use these lands. According to a 2005 Government Accounting Office (GAO) report on livestock grazing, "Fees charged by private ranchers and state land agencies are higher than the BLM and Forest Service fees because, generally, ranchers and state agencies seek to generate grazing revenues by charging a price that represents market value for that land and/or the services provided."

#### 3.32.2.2.2 Mineral Development and Production

Federal mineral activities include oil and gas leasing and production, mineral materials (sand and gravel and decorative stone), and some unpatented bentonite claims. There may also be a federal coal lease sale in 2011. Mining of private minerals include these same minerals as well as coal, sand and gravel, and platinum group minerals. Aggregated mining sectors (industry sectors 20-30) support approximately 5,126 total jobs and $511.8 million in labor income within the planning area (IMPLAN 2010). About 51 percent of the jobs and labor income in the mining sectors are associated with oil and gas related activities and 49 percent of the employment and income is associated with the other mining sectors (IMPLAN, 2010). The Stillwater mine (platinum and palladium) and Bull Mountains Mine No.1 (coal) are the largest mines in the planning area. The amounts of federal minerals and the dependency of local economies on BLM-managed federal mineral production vary among the counties.

#### 3.32.2.2.3 Oil and Gas

In March 2011, BLM had leases in effect covering 149,829 acres within the Billings Field Office boundaries. Annual lease rent is paid on 133,885 acres that are not held by production on leases with oil/gas being produced from one or more wells. According to the Office of Natural Resource Revenue (ONRR), estimated annual average (2005-2010) lease bonus and rental revenue to the federal government was about $600,000 (USDI, ONRR, 2011). Lease rent was not paid on 15,955 acres that were held by production. Instead, royalties are paid on oil and gas production from these leases. Leasing has been deferred on additional acres pending completion of the RMP and site specific environmental review. More Federal leases and more acres were leased in Carbon County than any other county in the Planning Area.

Leasing and production of federal minerals occurs in every county within the planning area except Big Horn and Wheatland (USDI, ONRR, 2011). Most Federal oil production occurs in Carbon County; with much smaller amounts in Musselshell, Stillwater, and Yellowstone Counties. The only reported natural gas production from Federal minerals within the Planning Area also occurs in Carbon County. While some gas production from Federal minerals does occur in Big Horn County, Montana, this comes from the mineral estate managed by the Miles City BLM office that is not part of this RMP.

Local oil and gas exploration, development, and production as well as gas pipeline transmission industry all support jobs and income in the local economy. Local contractors, as well as regional firms from Miles City and Park County, Wyoming, provide most of the contract services to local oil and gas fields. Between 1990 and 2008, there has been an average of one producing well and one dry hole drilled annually on federal minerals within the Planning Area. Currently there are 9 producing gas wells and 60 producing oil wells.

A portion of the revenues collected by the federal government is distributed to the state and counties. The amount that is distributed is determined by the federal authority under which the federal minerals are being managed. The leased acres changes daily as leases expire and other parcels are leased. Generally, within the planning area, public domain federal minerals account for about 58 percent of the acres leased; Bankhead-Jones lands account for about 41 percent of acres leased; and the other authorities for acquired minerals account for less than 1% of federal leased acres (BLM, LR 2000).

Forty-nine percent of these federal leasing revenues from public domain minerals are distributed to the state and the state distributes 25% back to the counties (Title 17-3-240, Montana Code Annotated). Twenty-five percent of the federal leasing revenues are distributed to the counties on federal minerals administered under the Bankhead-Jones Act. Based on August 2010 federal leased acreage, an estimated $462,000 was distributed to the state and local governments.

#### 3.32.2.2.4 Coal

Currently there are no mines producing coal from federal minerals. However, Signal Peak Energy applied in 2008 to lease approximately 61 million tons of federal coal beneath 2,680 acres about 10 miles southeast of Roundup straddling Musselshell and Yellowstone counties. The federal coal in question is within the company's existing mine plan and would be mined along with adjacent, nonfederal coal. Signal Peak is operating an underground mine that is expected to produce an annual average of 11.910 MM tons per year and has an expected life of 16 years. There is an estimated 37 million tons of recoverable federal coal.

Revenues associated with federal coal production would include coal lease bonus bids, annual rent, Abandoned Mine Reclamation Tax, Black Lung Disease Tax, production royalties, Montana Coal Severance Tax, Montana Resource Indemnity Trust Tax, and the Local Gross Proceeds Tax.

#### 3.32.2.2.5 Other Minerals

Other federal minerals produced include sand and gravel (average 6,500 cu. Yd/year @ $0.75/yd3); building stone (average 10 tons/yr. @ $7.50/ton); and bentonite (average 517,000 tons/year @ $60/ton). No revenues in the form of leases, rents, or federal or state royalties are collected on the production of these minerals. However, Montana has a Montana Bentonite Production Tax that is equal to $1.50 per ton of bentonite produced. Production of federal bentonite generates an estimated $$396,000 for this tax annually. After 2014, 77.95 percent of this tax revenue will be disbursed to the counties of production (Title 15-39-101 MCA). Currently, an estimated $309,000 of this is disbursed to Carbon County per year. Mining platinum-group metals at the Stillwater mine involves private minerals and is not related to BLM mineral management.

### 3.32.2.3 Economic Contributions

Total employment and labor income related to BLM managed minerals averages about 90 jobs and almost $5.2 million per year. Aggregated mining sectors (industry sectors 20-30) support

approximately 5,126 total jobs and $512 million in labor and proprietor income within the 10-county local economy (IMPLAN 2010). About half of the jobs and income are associated with oil and gas exploration, development, and production (IMPLAN 2010). The amounts of federal minerals and the dependency of local economies on that production vary among the counties. Carbon County has the only federal natural gas production and the largest amount of federal oil production.

Mineral and energy development is closely linked to fiscal conditions of local governments and school districts through contributions to local property-tax base, oil/gas production taxes, and federal mineral royalty payments on production from public mineral estate. Federal oil and gas leases generate a one-time lease bid as well as an annual rental. The bonus bid averaged $12.54 per acre (2005-2010); lease rental is $1.50 per acre per year for the first five years and $2.00 per acre per year thereafter. Annual lease rentals continue until one or more wells are drilled that result in production and associated royalties. Half of these federal leasing revenues are distributed to the state and the state distributes a portion back to the counties.

Oil and gas production in Montana is not subject to ad valorem, or property taxes; rather it is subject to production taxes. Federal oil and gas royalties generally equal 12.5 percent of the value of production. With production from public domain minerals, half of these royalties are distributed to the state, of which 25percent is distributed back to the county of production (Title 17-3-240, MCA). Twenty-five percent of the royalties are distributed to the counties on federal minerals administered under the Bankhead-Jones Act. The annual average (2005-2010) revenue disbursed to the counties is about $2.1 million.

#### 3.32.2.4 Recreation Use

The economic influence of recreation use is related to the amount of recreation use on public lands and related local expenditures for such items as gasoline, lodging, meals, and supplies. To understand the local/regional economic influence of recreation use, it is important to understand what recreation activities occur on public lands because local/regional expenditures vary depending on the type of activity, whether the recreation use is from local residents or non-local residents, and whether the activity involves overnight stays. Local/regional expenditures related to recreation use support local/regional employment and labor income (standard economic indicators). Generally, employment related to recreation and tourism tends to be seasonal and relatively low paid, with a high portion of the labor force self-employed. The recreation opportunities available in the Planning Area play an important role in the quality of life of some local residents, as well as attracting visitors from elsewhere in the state and region. BLM public lands in the Planning Area received an estimated 218,000 recreation visits in FY 2010. Pompeys Pillar National Monument received an additional 43,500 visits in FY 2010 (BLM, RMIS, 2010).

Nature-related recreation activities on BLM lands, e.g. fishing, hunting, and other wildlife related recreation use account for 30 percent of total use; non-motorized related recreation, e.g. backpacking, bicycling, camping, caving, hiking, horseback riding, photography, and picnicking account for about 60 percent, and motorized-related recreation, e.g. driving for pleasure and OHV use account for about 10 percent of total use. Recreation and tourism is not

classified or measured as a standard industrial category. Components of recreation and tourism activities are instead captured in other industrial sectors, primarily the retail sales and services sectors. It is assumed that recreation-related expenditures would be split among the following economic sectors: lodging, restaurants, groceries, gas/oil, other transportation, activities, admissions/fees, and souvenirs.

An annual total of 261,500 local and non-local visitors support an estimated 130 local jobs and $3.4 million in labor income within the local economy. Government revenues received from the recreation program are associated with recreation use permits issued. In Fiscal Year 2009, recreation use permits and associated total annual federal revenue was about $47,000. None of these revenues from the Billings Field Office and Pompeys Pillar National Monument are distributed to the state or counties.

Pompeys Pillar National Monument (PPNM): PPNM received an estimated 36,000 visitors in 2009. This included about 1,800 school children and 26,600 other visitors when the interpretative center was open during the summer tourist season. It is estimated that PPNM received an additional 7,500 visitors after hours and during the off season. Based on a BLM survey conducted in 2009, it is estimated that 65 percent of visitors are non-local (those visitors living more than 50 miles from the site). Average party size for non-local visitors was 2.7 people and average expenditure per party trip was $307.77. Visitor use fees collected at PPNM in Fiscal Year 2009 were about $35,000.

The estimated annual economic contribution to Yellowstone County of total annual visitation at PPNM is $1.79 million in total non-resident expenditures, 27 total jobs, and $822,000 in labor and proprietor's income. The estimated annual economic contribution from BLM management in 2009 was 16 total jobs and $467,000 in total labor and proprietor's income in Yellowstone County. The combined estimated annual economic contribution from visitation and BLM management to Yellowstone County is 43 jobs and $1.289 million in labor and proprietor's income. This is less than one tenth of one percent of Yellowstone County employment and income.

Visitation at PPNM creates an average of 0.79 jobs and $24,100 in labor and proprietor's income in Yellowstone County per 1,000 visitors. BLM management of PPNM contributes 28.92 jobs and $843,673 in labor and proprietor's income per $1 million in government labor and operations expenditures.

#### 3.32.2.5 Timber Harvest

Timber harvest from BLM lands within the Planning Area is relatively small. Forest products harvested and sold are summarized in Table 3-74. Four percent of revenue from salvage sales and from timber sales on public domain lands goes to the state.

**Table 3-74 Forest Products Harvested and Sold in the Billings Field Office (1994-2008)**

| Forest Product | Unit | Total Volume | Average/Year | Average Price/Unit | Total |
|---|---|---|---|---|---|
| Saw timber: Douglas-fir & lodgepole pine | ccf | 2,522 | 180 | $ 38/ccf | $95,380 |
| Pulp wood | ccf | 1962 | 131 | $ 1.00/ton | $150 |
| Post and pole | ccf | 23.675 | 2 | | |
| Biomass | ccf | 14,400 | 960 | $ .01/ton | $3.00 |
| Juniper | lbs | 16,530 | 1,102 | $ .05/lb | $100 |
| Fuelwood | ccf | 12 | 1 | $ 5.00/cord | $400 |
| Christmas Trees | ea | 0 | 0 | | |

### 3.32.2.6 Lands and Realty Actions

In 2007, the BLM issued or renewed eight rights-of-way for infrastructure in support of economic activities within the Planning Area. 2007 is representative of the annual BLM rental revenues received for federal rights-of-way. These rights-of-way covered almost 6,097 acres and the BLM received about $22,000 in rental income. Types of rights-of-way and amount of rental income by type are presented in Table 3-75. The most common types of rights-of-way were for oil and gas pipelines and power lines which generate the most rental income. None of these revenues are distributed to state, county, or local governments. It is important to recognize that while these rights-of-way may not generate much rental revenue, they do support infrastructure that is very important to local economic activity.

**Table 3-75 Federal Rights-of-Way Revenues by Type**

| Type | Annual Rental Income | Number of ROWs | Total Acres |
|---|---|---|---|
| Power Lines | $2,281 | 8 | 120 |
| Telecommunication Lines | 27 | 2 | 1 |
| Roads/Highways | 232 | 5 | 10 |
| Communication Sites | 1,800 | 1 | <1 |
| O & G Pipelines | 11,119 | 18 | 643 |
| Water Facilities | 86 | 4 | 4 |
| Wind Energy | 6,097 | 1 | 6,097 |
| **Total** | **$21,642** | **39** | **6,877** |

**Note:**
Source: Lands & Realty Database (LR2000)

### 3.32.2.7 Direct BLM Contributions to Area Economic Activity

Billings Field Office operations and management make a direct contribution to area economic activity by employing people who reside in the area and by expending dollars on other non-personnel needs. Management of BLM lands and resources is carried out by professional and administrative employees who are stationed in Billings and Pompeys Pillar. In FY 2010, the Billings Field Office (including Pompeys Pillar National Monument) had 30 permanent employees and 8 other than permanent; the BLM spent $3.3 million for labor and $4.5 million on operations. Total expenditures for the Field Office (including Pompeys Pillar) were about $7.8 million. Annual public revenues from visitor fees collected by the BLM at Pompeys Pillar were about $35,000 and annual fees at Shepherd Ah-Nei were about $9,000.

### 3.32.2.8 Ecosystem Restoration

Major activities associated with ecosystem restoration include treatment of invasive species and pest management, hazardous fuels treatments, and fire suppression and emergency stabilization.

#### 3.32.2.8.1 Weed Treatments

Economic effects of invasive species and their treatments are related to their influence on range productivity, wildfire risk, and attractiveness for recreation and ultimately on how these impacts affect local employment, income, and government revenues. Between 2003 and 2007, about 9,660 acres of public lands were treated at a cost of $200,200. This averages about 1,932 acres per year at an average cost of $40,038 per year. The treatment costs average about $20.72 per acre. A portion of these funds are made available to counties for weed treatments. This amounts to an annual average of about $30,000 to counties per year.

#### 3.32.2.8.2 Fire Suppression and Fuels Treatments

The cost of wildfire suppression within the Planning Area depends on the number and size of fires. Most wildfires are controlled in the initial attack, when they are relatively small. However, weather conditions, terrain, vegetation, and proximity to populated areas all contribute to the cost of fire suppression. In FY 2008, BLM spent almost $1.6 million on wildfire suppression ($388,000 labor and $1.2 million operations; BLM, Financial Management Information System, 2008). Operations costs associated with emergency stabilization following fire suppression were about $13,000. Since then, fire suppression costs have been considerably less. Restoration/fuel reduction efforts in Montana reduce fire hazard, improve ecological conditions of forested areas, and result in economic benefits that exceed the costs of reducing hazardous fuels (Keegan et.al., 2002). Table 3-76 is a summary of average annual fuel treatments and costs for the Billings Field Office.

**Table 3-76 Fuels Treatments (2003-2008)**

| Treatment Type | Acres/Year (2003-2008) | Contract/ Force Account | Cost/Acre | Totals/Year |
|---|---|---|---|---|
| Mechanical Treatment (WUI* and Non-WUI) | 651 | 50% Contract<br>50% Force Account | $400/acre<br>$300/acre | $130,200<br>$97,650 |
| Prescribed Fire WUI | 395 | Force Account | $15 | $5,903 |
| Prescribed Fire Non-WUI | 1,095 | Force Account | $20 | $21,900 |
| **Totals** | **2141** | | | **$255,653** |

**Note:**
*Wildland Urban Interface (WUI)

### 3.32.2.9 Payments to Counties

Payment to counties from BLM land management activities and public land and minerals uses are displayed in Table 3-77. Payments in lieu of taxes (PILT) and disbursement of mineral payments are the largest revenues that go to the counties. PILT payments are made to counties to compensate for federal lands that are exempt from local property taxes. Payment amounts are based on a complex formula that considers, among other things, revenue sharing from the previous year, county population, and acreage of a county in federal ownership. BLM portion of 2010 PILT payments to the eight counties in the Planning Area amounted to almost $620,000.

The Office of Natural Resource Revenue disburses a portion of the revenue received for mineral lease bonuses, rents, royalties and other mineral related revenues to the State of Montana. Montana redistributes a portion of these revenues to the counties of production. The revenues disbursed to the eight Montana counties in the Planning Area have averaged about $505,000 per year. A portion (77.95 %) of the Montana Bentonite Production Tax is distributed to counties of production. Based on recent past production, the average is about $309,000 per year.

An estimated average annual $224,000 has been provided to local governments and entities through community assistance agreements to reduce the risk of wildfire to communities.

Total annual payments to counties average about $1.78 million per year. These payments support about 30 jobs and $1.3 million in labor income (FEAST, 2010 and IMPLAN, 2010) within the local economy.

**Table 3-77 Annual Payments to Counties from BLM-Related Land/Mineral Uses**

| Weed Treatments | BLM Portion of 2010 PILT | Grazing Fees (average annual ) | Mineral Payments (average annual) | Community Assistance | Total (average annual) |
|---|---|---|---|---|---|
| $30,000 | $618,639 | $9,572 | $902,698 | $223,589 | $1,784,498 |

### 3.32.2.10 Employment and Income

Table 3-78 displays the current role of BLM-related contributions to the area economy by major BLM program area. The contributions are greater in some counties (generally where there are more public lands and minerals and resource uses) and less in others. Table 3-79 displays the current role of BLM-related contributions to the local economy by major industrial sectors.

**Table 3-78 Billings BLM Related Employment, and Income by Major BLM Program Area**

| Resource/Program Area | BLM-Related Jobs | BLM-Related Income ($1,000) |
|---|---|---|
| Grazing | 74 | $935 |
| Minerals | 88 | $5,197 |
| Recreation (including Pompeys Pillar) | 127 | $3,353 |
| Timber | 1 | $24 |
| Payments to States/Counties | 30 | $1,256 |
| BLM Expenditures | 90 | $6,194 |
| Total Resource Management | 410 | $16,961 |

**Note:**

Source: IMPLAN 2010
Source: FEAST 2010

**Table 3-79 Current Role of BLM-Related Contributions to the Area Economy**

| Employment | | | Labor Income (thousands of 2009 dollars) | | |
|---|---|---|---|---|---|
| Employment (Area Total)[a] | BLM-Related[b] | BLM Share of Total (%) | Income (Area Total)* | BLM-Related[b] | BLM Share of Total (%) |
| 151,573 | 410 | 0.27% | 6,251,337 | $16,961 | 0.27% |

**Note:**

a Source: IMPLAN 2010
b Source: FEAST 2010

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